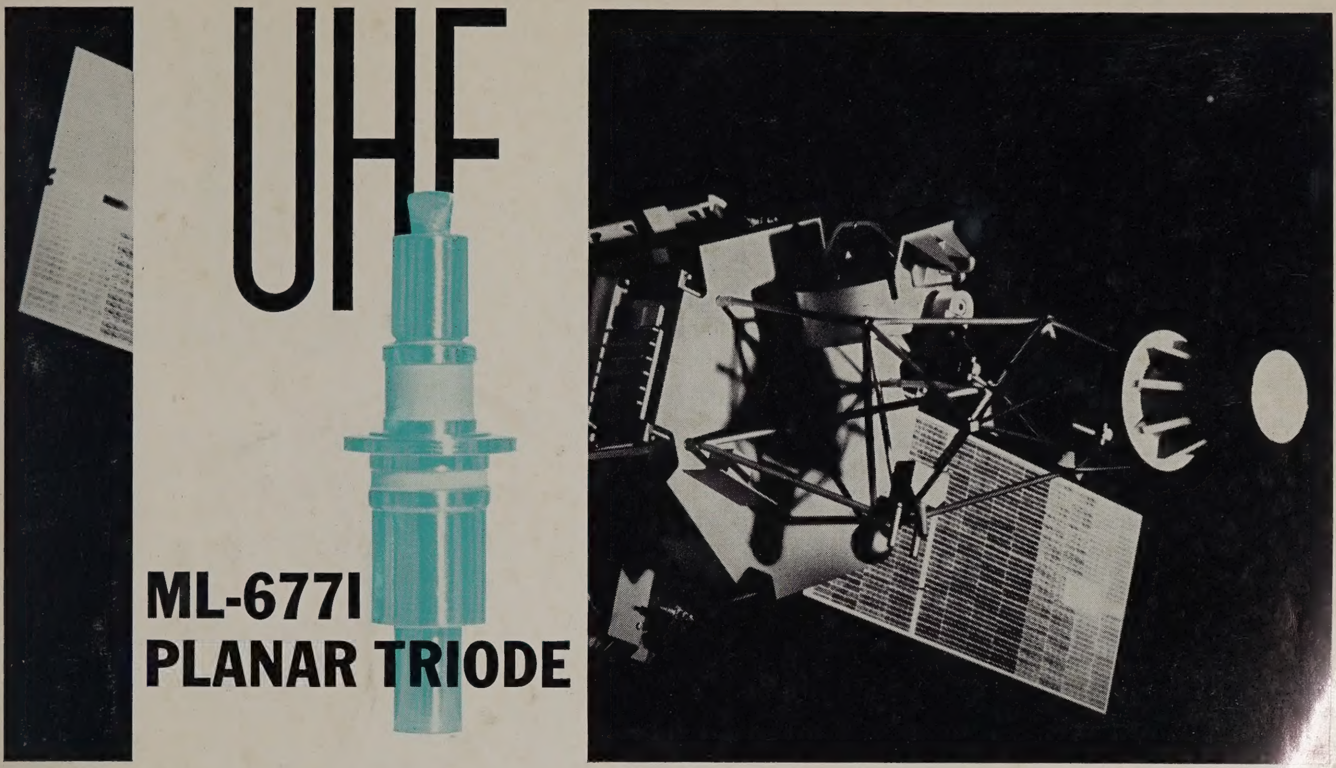


The **only** electron tubes aboard the **MARINER II** in rf circuits are the Machlett ML-6771 planar triodes, adapted specifically for this application

Space communications from the Mariner II Venus experiment were successfully maintained by the two 3-watt transmitters and ¼ watt driver, each powered by a Machlett special ML-6771 planar triode.

High reliability* is the reason that Jet Propulsion Laboratory, designer of the rf cavities, has chosen Machlett planar triodes.

*High reliability means, here, excellent cathode emission stability; and uniform long-life, performance achieved through the highest Quality Control standards.

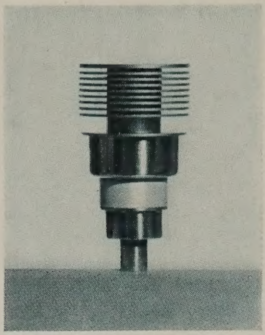
Send for
UHF Planar Triode Brochure

MACHLETT

An Affiliate of Raytheon Company

THE MACHLETT LABORATORIES, INC.

SPRINGDALE, CONNECTICUT



ML-8403

UHF planar triode provides frequency stable capability and high cathode current service to 3 Gc

ML-8403 is a ruggedized, high-cathode-current, frequency-stable anode, high-mu planar triode. It employs ceramic-to-metal construction, and is designed for use as a grid-pulsed, plate-pulsed, or CW oscillator, frequency multiplier, or amplifier in radio transmitting service from low frequency to 3 Gc.

Maximum Ratings
CW Oscillator and Amplifier

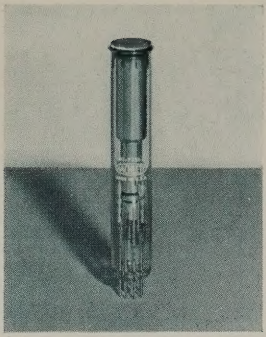
DC Plate Voltage	2000 Vdc
DC Grid Voltage	—150 Vdc
Plate Dissipation (forced-air-cooling)	100 W

Maximum Rating
Plate-Pulsed Oscillator
and Amplifier

Peak Plate Pulse Supply Voltage	3500 v

Maximum Ratings
Grid-Pulsed Oscillator
and Amplifier

Pulse Length	6 usec
Duty Factor	0.0033
DC Plate Voltage	2000 Vdc
Peak Plate Current from dc Supply	5.0 a



ML-7351A

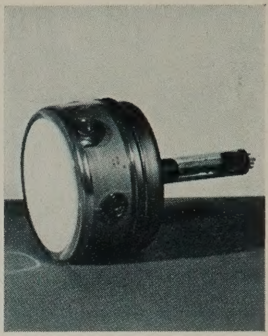
Highest sensitivity, tipless vidicon for low light level or slow-scan applications

ML-7351A is a tipless vidicon designed to provide extremely high sensitivity under 2870°K illumination. At 6000 Å the output is 25 ua/uW.

For slow-scan TV; operates with lower dark currents — at ASA 1200 a dark current of only 0.05ua is required (approx. ¼ of comparable tubes).

Operates with less than 0.05 ft-c. faceplate illumination, or average scene illumination of less than 2.5 ft-c. with f/2.0 lens.

Dimensions: dia. 1⅛″; length 6¼″.



ML-8443

Compact 5″ DVST for airborne radar applications where space is a premium

ML-8443 direct-view storage tube offers bright visual display of halftones and compact size without any sacrifice in performance.

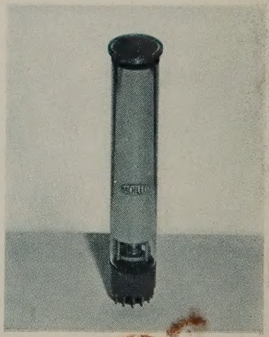
Size: 5″ dia. 8″ max. length
Resolution: 70 lines/in
Storage Time: 1 minute minimum
Deflection: Magnetic
Focus: Electrostatic
Writing Speed: 200,000 in/sec
Brightness: (At 6.5 kV view-screen potential) 1000 ft.L

ML-2058G

High resolution 2″ vidicon

Operates with conventional image orthicon deflection coils.

Offers 50% amplitude modulation at 1100 TV lines. Limiting resolution is 2000 TV lines. Also available with x-ray sensitive photoconductor. Maximum length is 12 in.



The Fundamental Switching Theorem for Diodes

The fundamental theorem for diode switches has been given by Hines [1] and discussed by Garver [2]. In the present letter we give a very short proof of the theorem using the scattering matrix formulation. The scattering matrix method allows generalization of the theorem to nonreciprocal structures, which are of interest because switching diodes can be used with them.

The theorem states that in a passive reciprocal linear network containing an ideal switch, we can express the change in reflection coefficient at the input port by the vector equation

$$\Gamma_{so} - \Gamma_{sc} = \frac{1}{2}\left[\frac{I_{sc}}{I_L}\right]\left[\frac{V_{so}}{V_L}\right].$$

Γ_{so} and Γ_{sc} are the reflection coefficients at the input port, the siwtch being in open and closed circuit conditions, respectively. I_{sc} and V_{so} are the current and the voltage at the switch when closed and open. I_L and V_L are the current and voltage at the output of the matched generator, when loaded by the characteristic impedance Z_1 of the line. The theorem is useful in establishing power limitations of switching devices and phase shifters.

Let a_1, a_2 be the waves traveling towards the network at the input and output and b_1, b_2 the waves reflected from the input and output. Then

$$b_1 = S_{11}a_1 + S_{12}a_2 \tag{1}$$

$$b_2 = S_{21}a_1 + S_{22}a_2. \tag{2}$$

Reciprocity requires $S_{12}Z_2 = S_{21}Z_1$. The reflection coefficient at the input is given by

$$\Gamma_{\text{in}} = \frac{b_1}{a_1} = S_{11} - \frac{S_{12}S_{21}}{S_{22} - \dfrac{1}{\Gamma_{\text{out}}}} \tag{3}$$

with

$$\Gamma_{\text{out}} = \frac{a_2}{b_2}.$$

Applying (3) for the open ($\Gamma_{\text{out}} = 1$) and closed ($\Gamma_{\text{out}} = -1$) switches gives

$$\Gamma_{so} - \Gamma_{sc} = \frac{-2S_{12}S_{21}}{S_{22}^2 - 1}. \tag{4}$$

With an open switch, $a_2 = b_2$, and the voltage V_{so} at the switch will be, from (2),

$$V_{so} = 2a_2 = \frac{-2S_{21}}{S_{22} - 1}\cdot a_1. \tag{5}$$

When closed, $a_2 = -b_2$, and the current through the switch with the sign convention corresponding to b_2 shown on Fig. 1 is

$$I_{sc} = \frac{b_2}{Z_2} - \frac{a_2}{Z_2} = \frac{2S_{21}}{S_{22} + 1}\cdot\frac{a_1}{Z_2}. \tag{6}$$

The product $V_{so}\,I_{sc}$, using (5) and (6), is

$$V_{so}I_{sc} = 2\frac{-2S_{21}^2}{S_{22}^2 - 1}\cdot\frac{a_1}{Z_2}\cdot a_1. \tag{7}$$

This can be rewritten as

$$V_{so}I_{sc} = 2\cdot\frac{-2S_{12}S_{21}}{S_{22}^2 - 1}\cdot\frac{S_{21}Z_1}{S_{12}Z_2}\cdot\frac{a_1}{Z_1}\cdot a_1. \tag{8}$$

Because the generator is matched, a_1 is the direct wave independent of the load [3] so that $a_1 = V_L$ and $a_1/Z_1 = I_L$. By inspection of (8) and (4)

$$\Gamma_{so} - \Gamma_{sc} = \frac{Z_2S_{12}}{Z_1S_{21}}\cdot\frac{1}{2}\left[\frac{I_{sc}}{I_L}\right]\left[\frac{V_{so}}{V_L}\right]. \tag{9}$$

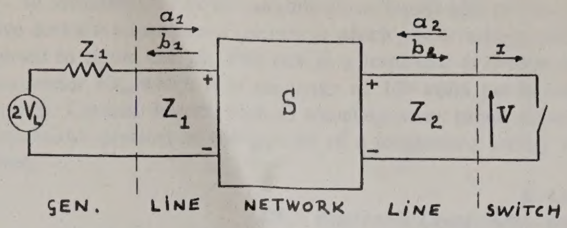


Fig. 1.

Equation (9) is the most general formulation of the change of the input reflection coefficient using passive linear structures with a switch. The power handling capability may be optimized, e.g., by using ferrites.

With the reciprocity condition, this reduces to

$$\Gamma_{so} - \Gamma_{sc} = \frac{1}{2}\left[\frac{I_{sc}}{I_L}\right]\left[\frac{V_{so}}{V_L}\right].$$

W. M. Van Loock
University of Ghent
Belgium

Manuscript received June 5, 1966.

References

[1] M. E. Hines, "Fundamental limitations in RF switching and phase shifting using semiconductor diodes," *Proc. IEEE*, vol. 52, pp. 697–708, June 1964.
[2] R. V. Garver and M. E. Hines, "Fundamental limitations in RF switching using semiconductor diodes," *Proc. IEEE (Correspondence)*, vol. 52, pp. 1382–1384, November 1964.
[3] H. J. Carlin and A. B. Giordano, *Network Theory*. Englewood Cliffs, N. J.: Prentice-Hall, 1964, p. 231.

E.O. JOHNSON'S LETTER:

Physical Significance of the Power-Amplification/Bandwidth Product of an Active Device

This letter discusses the elementary physical significance of the power-amplification/bandwidth product for an active device. Although the significance of this product may have been pointed out elsewhere, it does not seem to be generally known in the electron-device field, at least in explicit terms. The elementary physical viewpoint presented in this letter distinguishes two types of gain-bandwidth product and shows how one type serves as a physical parameter that limits the ultimate performance of a transistor.

A basic function of a system which processes information-bearing electrical signals is the addition of electrical energy to the signal from a power supply [1]. The performance of this function is one of the most important attributes of an active device. A figure of merit for this can be derived from the active device shown in Fig. 1. The device combines an input signal of energy W with a power-supply input of energy ΔW to produce an output signal $W_0 = W + \Delta W$: it is assumed that there is no internal energy loss. This process occurs in a time interval ΔT defined here as the interaction time. This time, equivalent to the input-output signal transit time, is important because the information-processing *rate* of a system or device is usually of primary concern.

A reasonable figure of merit M for an active device can be stated as follows:

$$M = \frac{1}{W} \times \frac{\Delta W}{\Delta T},$$

where the normalization factor $1/W$ is introduced so that power-handling devices do not assume undue advantage. This equation can be transformed as follows:

$$M = \frac{1}{W}\,\frac{\Delta W}{\Delta T} = \frac{\Delta W}{W}\,\frac{1}{\Delta T} = \frac{W_0 - W}{W}\,\frac{1}{\Delta T} \cong G_p\Delta f, \tag{1}$$

Manuscript received July 30, 1966.

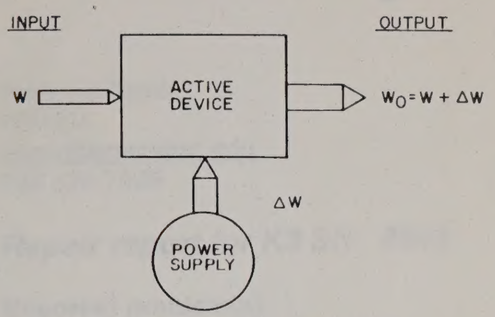


Fig. 1. Energy flow in an active device.

where G_p represents the power amplification of the device and Δf represents its bandwidth. Equation (1) describes the elementary physical relation which is the subject of this letter. In arriving at this result, it is assumed that the average output/input energy ratio is equal to the corresponding power ratio: also, that baseband conditions apply. The signal energy W may or may not appear in the output circuit depending on the type of device. In this discussion, as well as for most practical cases, W can be ignored in the output signal. Broadly interpreted, (1) emphasizes that the product of power amplification and bandwidth for an active device is a measure of the *rate* at which power-supply energy is converted to signal energy.

This interpretation distinguishes two types of power-amplification/bandwidth product: the "interaction" type discussed above, which applies to such devices as the grid-controlled vacuum tube and the transistor; and the "response" type, which relates to such devices as the traveling-wave tube, which has appreciable gain over a wide frequency spectrum, but also has a relatively long input-output signal transit time. In the latter type, a large "response" amplification/bandwidth product (the type normally given in performance specifications for such devices) is achieved at the expense of a long energy interaction time ΔT by clever use of a geometrically and electrically distributed structure.

For example, a typical traveling-wave tube having a specified gain-bandwidth product of a few gigahertz would have a product about one-tenth this value if its performance were evaluated in terms of energy interaction or signal transit time. This difference is not of practical importance in such applications as microwave repeater stations which process commercial television signals. On the other hand, the difference can be, and usually is, of great importance in a high-speed computer, where precise coincidence of signals is required after transit along different circuit paths.

In a lumped-circuit type of device, such as a grid-controlled vacuum tube or a transistor, the gain-bandwidth product relates quite directly with the energy interaction time. The simple physical notion of the gain-bandwidth product given above leads directly to the physical parameter that limits the ultimate performance of a transistor. In a typical transistor, power-supply energy enters by way of the collector circuit and is added directly to the collector-bound charge carriers which carry the signal. The maximum electrostatic energy that can be added to a carrier per unit length of carrier path is equal to the breakdown field E of the semiconductor material. For Ge and Si this field is of the order of 10^5 volts per centimeter. Furthermore, the maximum velocity that the carrier can attain is limited to the saturated drift velocity v_s, which is of the order of 10^7 centimeters per second for Ge and Si. This maximum velocity is reached at electric fields about one-tenth the value of the breakdown field E.

Therefore, the maximum time rate at which electrostatic energy can be added to the signal carriers in a Ge and Si transistor is given by the parameter Ev_s, which is of the order of 10^{12} volts per second. Accordingly, this parameter should play a key role in defining the performance capabilities and limitations of a transistor; a detailed analysis [2] indeed shows that such is the case. It has also been shown that the quantity Ev_s has a similar basic role in establishing the ultimate performance in other semiconductor devices, such as varactors, IMPATT oscillators, and possibly also Gunn oscillators [3].

In summary, the power-amplification/bandwidth product of an active device is a measure of the rate at which power-supply energy is converted to signal energy. This rate in a transistor is determined by the parameter Ev_s, which is of the order of 10^{12} volts per second for Ge and Si. Certain devices, such as traveling-wave tubes, achieve a large bandwidth product at the expense of a lengthened energy interaction time.

E. O. Johnson
RCA Electronic Components and Devices
Harrison, N. J.

References

[1] See, for example, IRE Standard 58 IRE 3.S1 for definition of an active transducer.
[2] E. O. Johnson, "Physical limitations on frequency and power parameters of transistors," *RCA Rev.*, vol. XXVI, pp. 163–177, June 1965.
[3] Personal communication with J. M. Early and B. C. De Loach, Jr., of the Bell Telephone Laboratories, Inc., Allentown, Pa.

The Reproducibility of a Planar Distribution from the Pattern Amplitude

It is known that in general a source distribution is not uniquely determined by the amplitude of the radiation pattern. It has been shown, however, that considerable information about a source distribution can be gained from the pattern amplitude alone if the distribution consists of a dominant central influence and smaller perturbing terms on a line outside the central region [1].

In this letter we will show that this development can be applied to the planar source distribution also. Information can be obtained about the distribution from the pattern amplitude alone if it is known that the distribution consists of a dominant central source with smaller sources on a plane outside the central region.

For a planar source distribution the field is given by the two-dimensional Fourier transform

$$E(\psi, \gamma) = \int_{-\infty}^{\infty}\int_{-\infty}^{\infty} I(y, z)\epsilon^{jz\psi}\epsilon^{jy\gamma}\, dydz \qquad (1)$$

with inverse

$$I(y, z) = \frac{1}{(2\pi)^2}\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} E(\psi, \gamma)\epsilon^{-jz\psi}\epsilon^{-jy\gamma}\, d\psi d\gamma \qquad (2)$$

where

$$\psi = \frac{2\pi}{\lambda}\cos\theta \qquad (3)$$

$$\gamma = \frac{2\pi}{\lambda}\sin\theta\sin\phi. \qquad (4)$$

In terms of $I(y, z)$ we wish to determine the value of (2) if the field magnitude $|E(\psi, \gamma)|$ is used.

Let us define

$$F(\psi, \gamma) = \int_{y=-a}^{a}\int_{z=-b}^{b} I(y, z)\epsilon^{jz\psi}\epsilon^{jy\gamma}\, dydz \qquad (5)$$

and consider this the most important part of $E(\psi, \gamma)$.

We may then write

$$\begin{aligned} E(\psi, \gamma) = F(\psi, \gamma) &+ \int_{-\infty}^{-a}\int_{-\infty}^{-b} I(y, z)\epsilon^{jz\psi}\epsilon^{jy\gamma}\, dydz + \int_{-\infty}^{-a}\int_{-b}^{b} \\ &+ \int_{-\infty}^{-a}\int_{b}^{\infty} + \int_{-a}^{a}\int_{-\infty}^{-b} + \int_{-a}^{a}\int_{b}^{\infty} + \int_{a}^{\infty}\int_{-\infty}^{-b} \\ &+ \int_{a}^{\infty}\int_{-b}^{b} + \int_{a}^{\infty}\int_{b}^{\infty} \qquad (6) \end{aligned}$$

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ELECRAFT

Date: 16 August 2018

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608 328-7596

Repair report for K3 SN 8543 *RSA # 8364*

Reported problem(s):
Errors Hi RFI and DSE.
Upgrades; KIO3BUPKT, CBLP3Y, (K312MDKT had already been done).

Problem(s) found:
Radio stuck in MCU load, could not load DSP.
5V supply at 3.5 volts, bad U12 5V regulator on RF board. (this will cause all kinds of random errors!)
KAT3 standoff loose, customers special 2-D block did not line up and his jumper lug was loose and strands of wire fell out.
Some cover screws wrong.
Cross threaded and stripped LPA screw/standoff.
Loose VFO A encoder, missing 2nd locknut.

Repair(s) performed:
Replaced 5V regulator U12 on RF board.
EE INIT-ialized radio to factory defaults, setup and calibrated. Do NOT load saved config files, see below!
Installed correct 2-D block at KAT3 standoff, tightened.
Installed correct cover hardware.
Replaced LPA standoff and screw.
Installed/tightened VFO A encoder nuts correctly.

Installed new KIO3BUPKT;
**NOTE Radio is now set for RS232 = USB

Final checkout and alignment.

Updates performed;
KPOD Ready, FP R82 to 6.8 ohm
Loaded new Firmware 5.62
KBPF3AMDKT, Mod KBPF3 for new low 135 & 475Khz bands (KSYN3A required!)
7T Capacitor

K3 SN 8543 meets or exceeds all factory specifications.

NOTE!! Radio has been factory calibrated and aligned.
Do NOT reload any saved configuration files as the factory calibration will be overwritten. Now is a good time to delete old configuration files, do a fresh save, then set up any personal settings and do another save.

If you have any questions about these repairs or updates, please email support@elecraft.com

73, Keith Trinity, WE6R, Elecraft Tech.

ELECRAFT
125 Westridge Drive
Watsonville CA 95076
www.elecraft.com

Invoice

Ship Date	Invoice #
8/20/2018	158982

Bill To	Ship To
W9ADJ James Beyer 6213 Countryside Ln Madison, WI 53705	James Beyer 6213 Countryside Ln Madison, WI 53705

Order Number	Terms	Rep	Order Date	Via	F.O.B.	Payment Meth...
RSA #8364	Prepaid - CC	0818	8/17/2018	UPS	Watsonville	

Quantity	Item Code	Description	Price Each	Amount
3	Service, K3	K3 Service SN 08543	99.00	297.00
1	KIO3BUPKT-F	KIO3B UPGRADE KIT INSTALLED	399.95	399.95T
		ADD TO BOX:		
1	CBLP3Y	K3S adptr cable, existing P3 owners only	39.95	39.95T
1	Shipping & Handling	Shipping	47.00	47.00T

Ten Tek
81908-5
pwr in relay

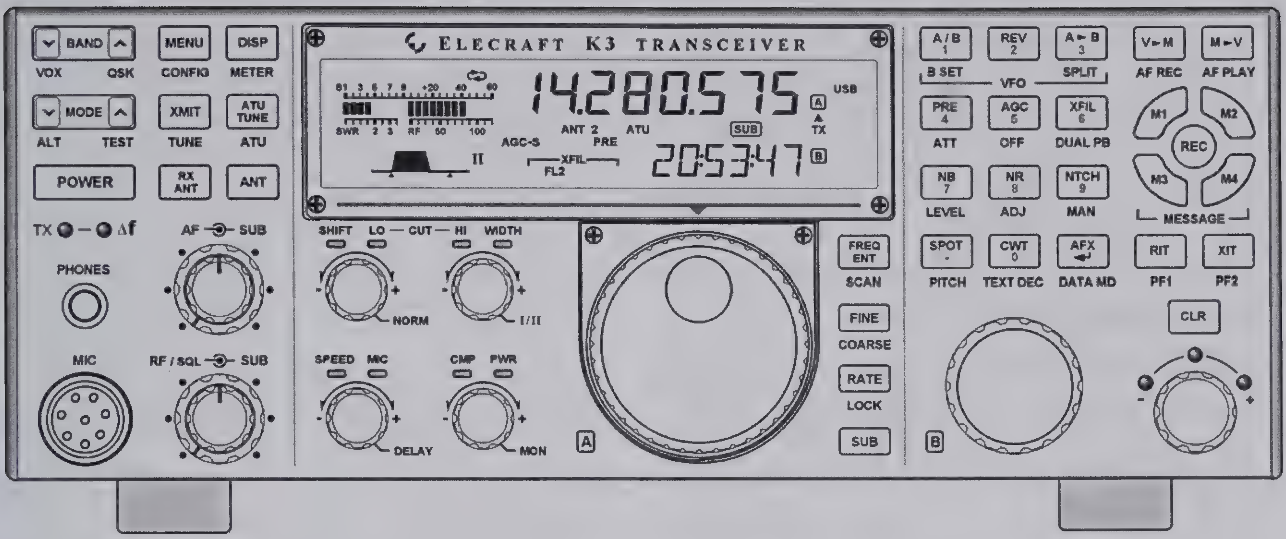
Subtotal	$783.90
Sales Tax (0.0%)	$0.00
Payments/Credits	$0.00
Balance Due	$783.90

PAID

8543

8316548

3020786-10555



ELECRAFT® K3

HIGH-PERFORMANCE 160 – 6 METER TRANSCEIVER

KXV3A INTERFACE OPTION INSTALLATION INSTRUCTIONS

Rev B, December 28, 2011

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Contents

Introduction 3
- Customer Service and Support 3
  - Technical Assistance 3
  - Repair / Alignment Service 3
- Preventing Electrostatic Discharge Damage 4
- How ESD Damage Occurs 4
- Preventing ESD Damage 4

Preparing for Installation 5
- Tools Required 5
- Parts Included 6

Installation Procedure 6
- Removing the Top Cover 6
- Removing the K144XV 2-Meter Module 7
- Removing the KRX3 Sub Receiver Module 8
- Removing the Bottom Covers and KIO3 Board 9
- Installing the KXV3A Board 10
- Reinstalling the KIO3 Board 13
- Replacing the Top Cover 15

Enabling the KXV3A Module 16

Introduction

The KXV3A Interface provides a separate receive antenna input and output, an input and output for use with an external transverter, and a buffered i.f. output. These inputs and outputs are via rear-panel BNC connectors. The KXVA also contains transverter I.F. in/out connectors for use with the K3's internal K144XV 2-meter option module. Complete details for using the KXV3A are included in your K3 Owner's manual. This manual covers the installation of the KXV3A Interface option in your K3 transceiver.

Only a few basic hand tools are needed (see page 5) to perform the installation. No soldering or wiring is required.

Customer Service and Support

Technical Assistance

You can send e-mail to k3support@elecraft.com and we will respond quickly - typically the same day Monday through Friday. Telephone assistance is available from 9 A.M. to 5 P.M. Pacific time (weekdays only) at 831-763-4211. Please use e-mail rather than calling when possible since this gives us a written record of the details of your problem and allows us to handle a larger number of requests each day.

Repair / Alignment Service (We want to make sure everyone succeeds!)

If necessary, you may return your Elecraft product to us for repair or alignment. (Note: We offer unlimited email and phone support to get your kit running, so please try that route first as we can usually help you find the problem quickly.)

IMPORTANT: You must contact Elecraft before mailing your product to obtain authorization for the return, what address to ship it to and current information on repair fees and turn around times. (Frequently we can determine the cause of your problem and save you the trouble of shipping it back to us.) Our repair location is different from our factory location in Aptos. We will give you the address to ship your kit to at the time of repair authorization. *Packages shipped to Aptos without authorization will incur an additional shipping charge for reshipment from Aptos to our repair depot.*

Elecraft's 1-Year Limited Warranty

This warranty is effective as of the date of first consumer purchase (or if shipped from factory, date product is shipped to customer). It covers both our kits and fully assembled products. For kits, before requesting warranty service, you should fully complete the assembly, carefully following all instructions in the manual.

Who is covered: This warranty covers the original owner of the Elecraft product as disclosed to Elecraft at the time of order. Elecraft products transferred by the purchaser to a third party, either by sale, gift or other method, who is not disclosed to Elecraft at the time of original order, are not covered by this warranty. If the Elecraft product is being bought indirectly for a third party, the third party's name and address must be provided to Elecraft at time of order to insure warranty coverage.

What is covered: During the first year after date of purchase, Elecraft will replace defective or missing parts free of charge (post-paid). We will also correct any malfunction to kits or assembled units caused by defective parts and materials. Purchaser pays inbound shipping to Elecraft for warranty repair, Elecraft will pay shipping to return the repaired equipment to you by UPS ground service or equivalent to the continental USA and Canada. Alaska, Hawaii and outside U.S. and Canada actual return shipping cost paid by owner.

What is not covered: This warranty does not cover correction of kit assembly errors. It also does not cover misalignment; repair of damage caused by misuse, negligence, or builder modifications; or any performance malfunctions involving non-Elecraft accessory equipment. The use of acid-core solder, water-soluble flux solder, or any corrosive or conductive flux or solvent will void this warranty in its entirety. Also not covered is reimbursement for loss of use, inconvenience, customer assembly or alignment time, or cost of unauthorized service.

Limitation of incidental or consequential damages: This warranty does not extend to non-Elecraft equipment or components used in conjunction with our products. Any such repair or replacement is the responsibility of the customer. Elecraft will not be liable for any special, indirect, incidental or consequential damages, including but not limited to any loss of business or profits.

Preventing Electrostatic Discharge Damage

There is no climate or work location where the components of your K3 are safe from Electrostatic Discharge (ESD) unless you take specific steps to prevent such damage. Many of the components in your K3 can be damaged by static discharges of only a few volts: far too little for you to notice. It is those low-voltage but destructive discharges that easily happen anywhere and under virtually any environmental conditions.

ESD damage may not be apparent at first. The damaged components may not fail completely. Instead, the damage may result in below-normal performance for an extended period of time before you experience a total failure.

How ESD Damage Occurs

Whenever an object containing a static charge touches a circuit in your K3, current will rush into the circuit until the components reach the same voltage as the source of the static charge. If the voltage or current that passes through a component during that brief period exceeds its normal operating specifications, it may be damaged or destroyed.

Preventing ESD Damage

ESD damage cannot occur if there is no voltage difference between the components in your K3 and any object that touches them. That is how anti-static packaging works. Anti-static bags allow the static charge to flow over their surface, so that any part of the bag that touches the components inside are all at the same potential at all times. Anti-static foam keeps the leads of sensitive components at the same potential.

At your work bench, avoiding a dangerous voltage is achieved most easily by tying everything together and connecting them to a common mains safety ground. This includes your K3, individual boards or other sensitive components as well as everything they may touch at the work table.

Inexpensive static dissipating work mats are readily-available that will steadily and safely drain off any charges built up on parts or circuit boards placed on them. They are supplied with a lead that connects the mat to the common workbench ground. Also, metal cabinets on test equipment used on the bench should be tied together and connected to the common ground.

Most importantly, you must have a way of continuously draining off any static charges that occur on your body. Such charges are easy to create, even while sitting quietly at the work bench. Moving your feet on the floor, shifting position in your chair or even moving your arms so that clothing rubs against itself can produce destructive static charges. You can discharge yourself by touching an unpainted metal ground, but that will last only until you move in a way that produces a new static charge. The safest technique is to wear a grounded wrist strap with a series 1-megohm resistor that continuously drains off any charges. Such wrist straps are readily-available and inexpensive.

⚠ *WARNING*

DO NOT attach a ground directly to yourself without a current-limiting resistor as this poses a serious shock hazard. A wrist strap must include a 1-megohm resistor to limit the current flow. If you choose to touch an unpainted, metal ground to discharge yourself, do it only when you are not touching any live circuits with your other hand or any part of your body.

We strongly recommend you take the following anti-static precautions (listed in order of importance) to avoid trouble:

- Leave ESD-sensitive parts in their anti-static packaging until you install them. The packaging may be a special plastic bag or the component's leads may be inserted in conductive foam. Parts which are especially ESD-sensitive are identified in the parts list and in the assembly procedures.
- Wear a conductive wrist strap with a series 1-megohm resistor. If you do not have a wrist strap, touch a ground briefly before touching any sensitive parts to discharge your body. Do this frequently while you are working. You can collect a destructive static charge on your body just sitting at the work bench. **DO NOT attach a ground directly to yourself as this poses a serious shock hazard.**
- Use a grounded anti-static mat on your work bench.
- If you choose to use a soldering iron to work on your K3 for any reason, be sure your iron has an ESD-safe grounded tip tied to the same common ground used by your mat or wrist strap.

Preparing for Installation

Tools Required

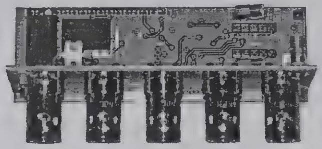
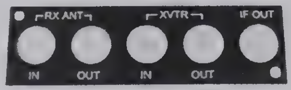
1. #0 and #1 size Phillips screwdrivers. To avoid damaging screws and nuts, a power screwdriver is ***not*** recommended. Use the screwdriver that best fits the screw in each step.
2. Wrench to remove jack screw nuts on the K3 back panel. 3/16" nut driver recommended.
3. Small diagonal cutters.
4. Small needle-nose pliers or tweezers to position small parts.
5. Soft cloth or clean, soft static dissipating pad to lay cabinet panels on to avoid scratching.

The following tools are strongly recommended:

1. ESD wrist strap.
2. Static dissipating work pad.

Parts Included

The following parts should be included in your kit. Check to ensure you have them all. If any parts are damaged or missing, contact Elecraft for replacements (see *Customer Service and Support*, page 3).

ILLUSTRATION	DESCRIPTION	QTY.	ELECRAFT PART NO.
	KXV3A Printed Circuit Board Assembly ⚠ ***ESD Sensitive.***	1	E850244
	XV3 Connector Panel	1	E100224SS
	KXV3A TMP Cable Assembly	1	E850292
	Screw, 4-40, 1/2" (13 mm)	2	E700030
	Lockwasher, 4-40, inside tooth	2	E700010
	Nut, 4-40	2	E700011

Installation Procedure

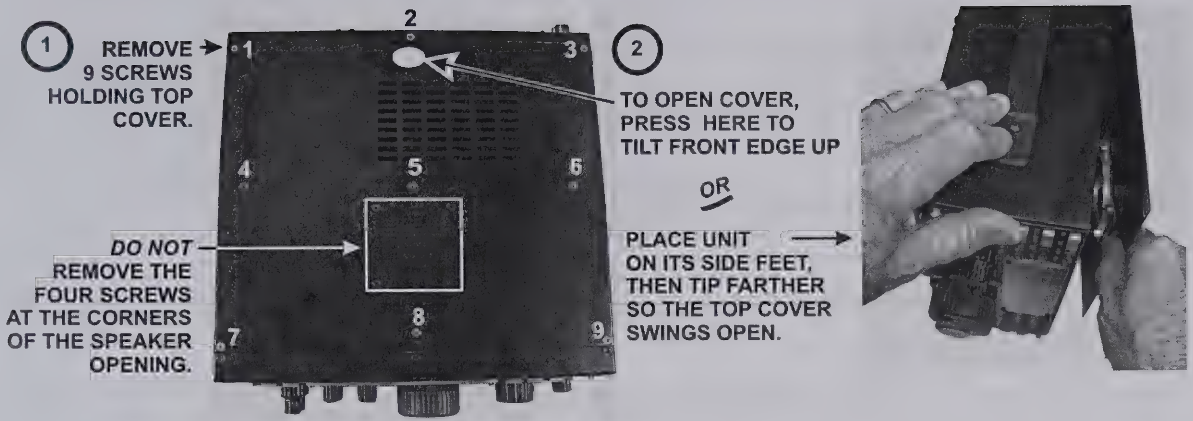
⚠ **SPECIAL NOTE FOR K3 KIT BUILDERS: If you were directed here by the K3 Kit Assembly Manual to install your KXV3A Module, inventory the parts in this kit against the list under *Parts Included* on page 6 then begin installation at the step indicated on page 10.**

Removing the Top Cover

☐ Disconnect power and all cables from your K3.

☐ Remove the nine screws to free the top cover as shown in Figure 1. After the cover is open, lift it gently to reach the speaker wire connector. Unplug the speaker then set the top cover aside in a safe place.

> ⚠ **Whenever you remove screws from a panel, if one screw seems too tight to loosen without damaging it, first loosen the other screws then try again. Sometimes one screw binds in its hole when the other screws are tightened.**



①
REMOVE 9 SCREWS HOLDING TOP COVER.
1
2
3
4
5
6
7
8
9
②
TO OPEN COVER, PRESS HERE TO TILT FRONT EDGE UP
OR
PLACE UNIT ON ITS SIDE FEET, THEN TIP FARTHER SO THE TOP COVER SWINGS OPEN.
DO NOT REMOVE THE FOUR SCREWS AT THE CORNERS OF THE SPEAKER OPENING.

Figure 1. Removing K3 Top Cover.

⚠ CAUTION: Touch an unpainted metal ground or wear a grounded wrist strap before touching components or circuit boards inside the K3. See *Preventing ESD Damage* on page 4 for more information.

Removing the K144XV 2-Meter Module

If you do not have the K144XV 2-meter option installed, skip this section and go to *Removing the KRX3 Sub Receiver Module* on page 8.

☐ Remove the stiffener bar that runs from side to side across the top of the K3 chassis. This is the bar the three screws across the center of the top cover thread into. The bar is held in place by a single screw at each side and, if the KPA3 100 watt option is installed, by two screws attaching it to the KPA3 shield. Some KPA3 shields have PEM nuts permanently attached to the shield for the screws. Others use ordinary nuts that must be removed with the screws and lock washers.

☐ The K144XV module is mounted on the left side panel of the K3. Remove the five screws shown in Figure 2 and lift the top cover off of the module. Note: Some units may have a sixth screw in the hole near the Elecraft name on the top cover that must be removed.

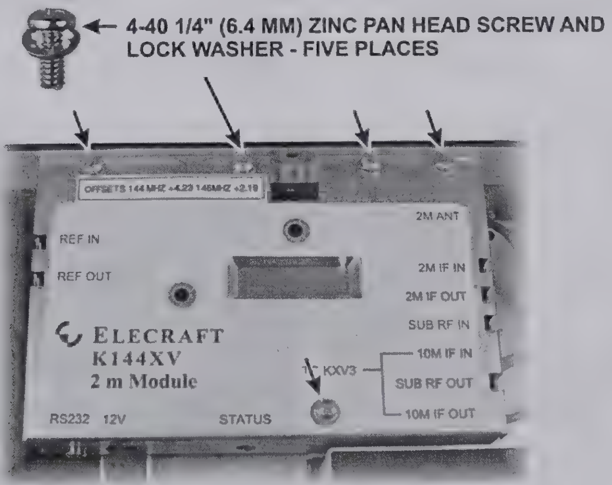


Figure 2. Removing the K144XV Top Cover.

☐ Unplug the coaxial cables and the power connector attached to the K144XV module. Pull on the metal part of the TMP coaxial connectors. Do not pull on the cables.

☐ Remove the three 6-32 screws that secure the K144XV module to the side panel. Hold the module to keep it from falling if the KRX3 sub receiver is not installed. Lift the module out, set the top cover on it to protect it, and set it aside in a safe place.

Removing the KRX3 Sub Receiver Module

If you do not have the KRX3 sub receiver installed, go directly to *Removing the Bottom Covers and KIO3 Board* on page 9.The KRX3 sub receiver module is the "L" shaped metal enclosure (see Figure 3). Remove the sub receiver module as follows:

☐ Remove the chassis stiffener bar that runs across the top of the K3 chassis and is attached to the side panels. If the KPA3 is installed, the stiffener will be attached to the KPA3 shield by two screws. These screws may have nuts and lock washers or they may thread into permanently-attached PEM nuts on the stiffener bar.

☐ Remove the two 1-1/2" (38 mm) screws and lock washers shown in Figure 3. These screws extend all the way through the KRX3 module and secure it to standoffs mounted on the main RF board that fills the bottom of the K3.

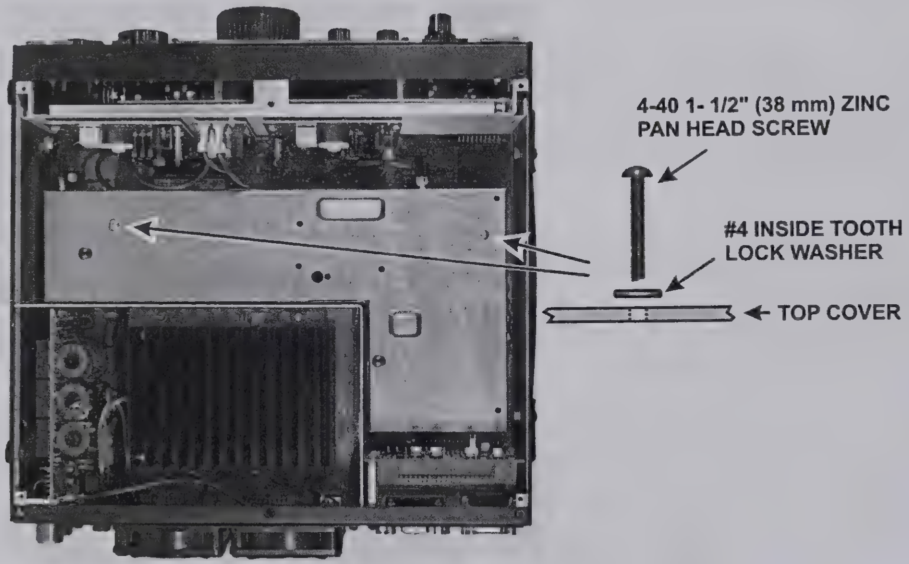

4-40 1- 1/2" (38 mm) ZINC PAN HEAD SCREW
#4 INSIDE TOOTH LOCK WASHER
TOP COVER

Figure 3. Removing the KRX3 Module.

⚠ In the following steps you will handle small TMP coaxial connectors. These are friction-fit connectors shown in Figure 4. **Handle the connectors by the grips as shown.** ***Do not pull on the coaxial cable.***

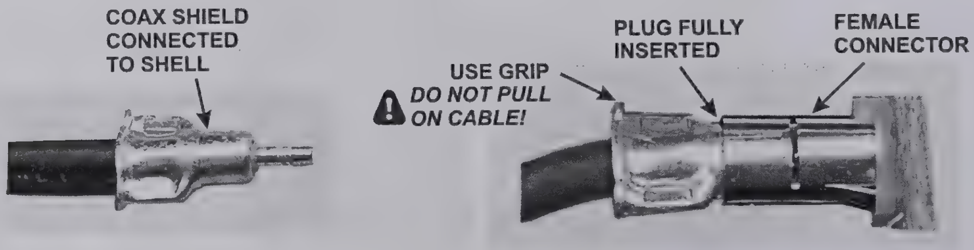


Figure 4. TMP Cable Connectors.

☐ Hold the KRX3 module by the two brass knurled nuts on the top, and lift it straight up to gain access to the small TMP coaxial connectors plugged into the module. There are two along the front. There may be one at the back as well, depending upon the options installed. As you lift the KRX3 module, it will unplug from two small interface circuit boards. One is at the front and the other is at the rear. These small boards may come out with the module or they may remain attached to the K3 main RF board.

☐ Unplug the TMP coaxial cables leading to the KRX3 module, then lift the module free and set it aside.

☐ Locate the two small interface circuit boards, remove them and put them in a safe place.

Removing the Bottom Covers and KIO3 Board

⚠ **If you are replacing a previously-installed KXV3 with the KXV3A, you will not need to remove the bottom covers and install a new TMP cable or cut jumpers W1 and W2 as described in the following steps. Simply remove the existing KXV3 board and replace it with the KXV3A using the existing TMP cable.**

☐ Remove the Digital I/O module from the KIO3 Board at the rear of the K3 as shown in Figure 5.

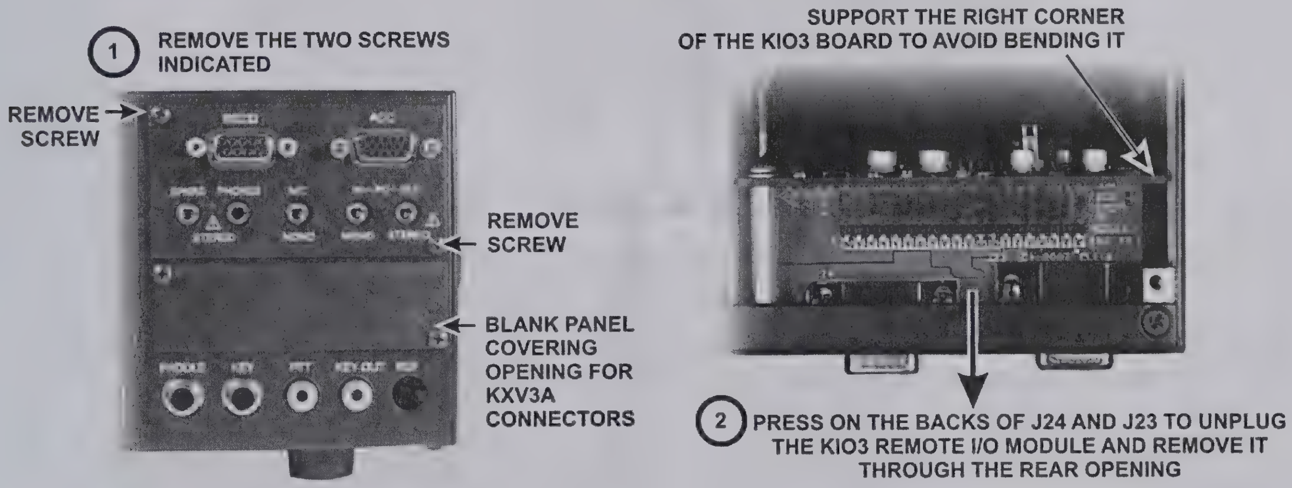
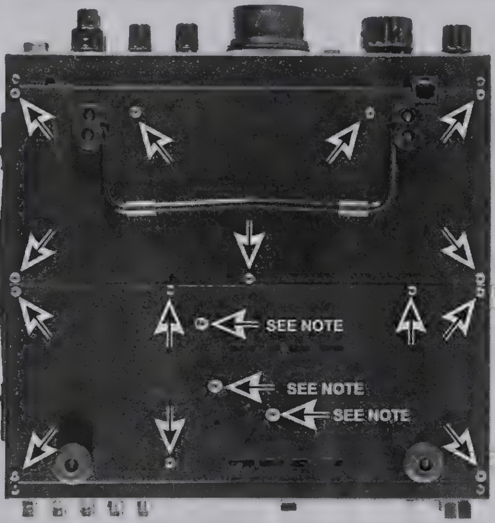

① REMOVE THE TWO SCREWS INDICATED
REMOVE SCREW
REMOVE SCREW
BLANK PANEL COVERING OPENING FOR KXV3A CONNECTORS
SUPPORT THE RIGHT CORNER OF THE KIO3 BOARD TO AVOID BENDING IT
② PRESS ON THE BACKS OF J24 AND J23 TO UNPLUG THE KIO3 REMOTE I/O MODULE AND REMOVE IT THROUGH THE REAR OPENING

Figure 5. Removing the Digital I/O Module.

☐ Tilt the top of the KIO3 Main board toward the front panel gently so the standoff at the top clears the lip on the rear panel, then use the standoff at the top to lift up on the board while rocking it from side to side to unplug the connector.

☐ Remove the blank panel covering the space for the KXV3A module (see Figure 5). This panel will not be replaced.

☐ Turn the K3 upside down and remove the bottom covers (see Figure 6).



REMOVE ALL THE SCREWS INDICATED AND LIFT THE BOTTOM COVERS OFF.

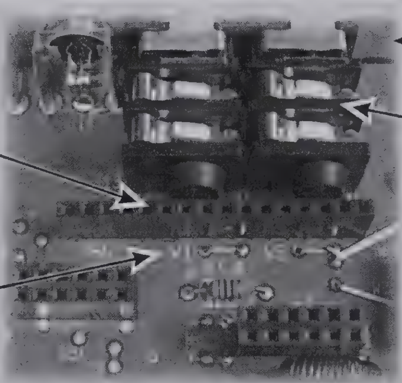
NOTE:
THESE THREE SCREWS ARE 1/4" (6.4 mm) LONG AND HAVE INSIDE TOOTH LOCK WASHERS UNDER THE SCREW HEADS.
ALL THE OTHER SCREWS ARE 3/16" (4.8 mm) LONG AND HAVE NO LOCK WASHERS.

Figure 6. Removing the Bottom Covers.

Installing the KXV3A Board

⚠ **SPECIAL NOTE TO KIT BUILDERS: If you were directed here to install your KXV3A module as part of the overall kit assembly, begin with the following step.**

☐ Remove jumpers W1 and W2. The jumpers may be wires plugged into connector J66, or they may be wire jumpers soldered to pads on the RF board (see Figure 7). If soldered to the board, take care not to lose any pieces of wire inside the K3. No more than 1/8” (3mm) of lead length should be left to avoid the possibility of shorting to a nearby circuit. ***Take care to identify the correct jumpers. Do not cut nearby jumpers W20 or W21!***



NORMALLY W1 AND W2 ARE WIRES INSERTED INTO THE CONNECTOR. REMOVE THEM.

ON SOME BOARDS W1 AND W2 MAY BE WIRE JUMPERS SOLDERED TO THE BOARD. IF SO, CAREFULLY]CUT THEM, TAKING CARE NOT TO DAMAGE RFC30.

REAR PANEL

KEY AND PADDLE JACKS

⚠ ESD SENSITIVE!

Figure 7. Removing Jumpers W1 and W2.

☐ Inspect the white connector at the end of the TMP cable. The side nearest the connector holes must be smooth and flat. Use your diagonal cutters or a hobby knife to cut away any bumps or ridges (see Figure 8).

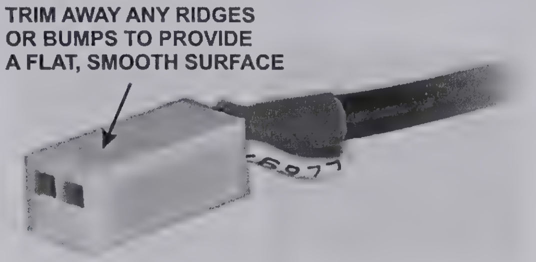


Figure 8. Preparing TMP Cable for Installation.

⚠ *CAUTION:* **The KXV3A board is ESD sensitive. Wear a grounded wrist strap or touch an unpainted metal ground before handling it.**

☐ Remove the KXV3A board assembly from its packaging. If the black panel is mounted on the assembly, remove it. Set the screws and washers aside to be installed later.

☐ Fit the TMP coaxial connector onto J87 on the KXV3A board assembly (see Figure 9).

☐ Thread the square connector on the TMP cable through the gap between Q3 and the side of the RF board, then plug the KXV3A board assembly into J66 on the RF board with the BNC connectors facing out through the rear panel (see Figure 9). The pins will just clear the top of J66 when the BNC connectors are up against the top of the opening in the rear panel.

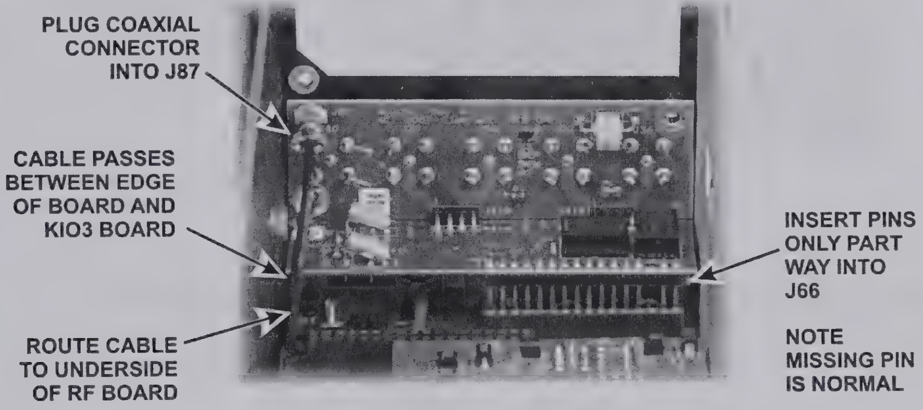

PLUG COAXIAL CONNECTOR INTO J87
CABLE PASSES BETWEEN EDGE OF BOARD AND KIO3 BOARD
ROUTE CABLE TO UNDERSIDE OF RF BOARD
INSERT PINS ONLY PART WAY INTO J66
NOTE MISSING PIN IS NORMAL

Figure 9. Mounting KXV3A Board.

☐ Push the connector pins into J66 only as far as needed so the holes in the KXV3A connector bushings are aligned with the holes in the back panel as shown. These connectors do not fully mate and the bushings hold the board away from the rear panel. .

> ⚠ **As you install components and reassemble your K3, be sure all the screws are in place and secure, but do not over tighten them. Failure to tighten all screws may result in poor shielding of sensitive components, resulting in possible noise or birdies in the receiver as well as other difficult-to-trace problems.**

☐ Mount the KXV3A rear panel over the BNC connectors using two 4-40 1/2” (13mm) black pan head screws through the corner holes with #4 inside tooth lock washers and 4-40 nuts on the inside as shown in Figure 10. Do not fully tighten the nuts yet.

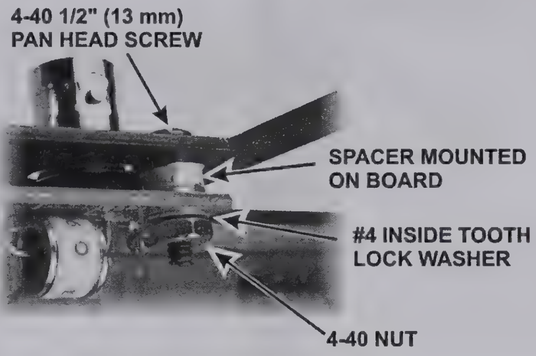


Figure 10. Mounting Hardware.

☐ Adjust the depth the KXV3A board connector mates J66 on the RF board so the KXV3A connector panel is parallel with the back panel. The pins on the KXV3A board connector do not go all the way into J66 as shown in Figure 11.

⚠ **ESD SENSITIVE!**

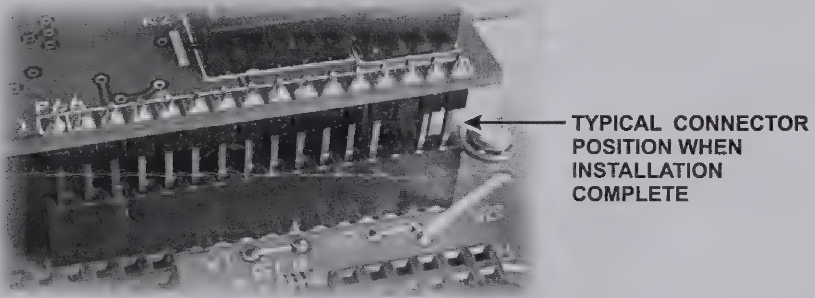


Figure 11. Typical Connector Fit.

☐ Tighten the screws and nuts holding the KXV3A to the back panel that you installed earlier (See Figure 10)

☐ Route the coaxial cable from the KXV3A board to connector P86 on the bottom of the RF board as shown in Figure 12. Mate the connector to P86 as shown. If the connector does not appear to fit, check to make sure there are no plastic ridges on the side toward the RF board (see Figure 8).

ESD SENSITIVE!

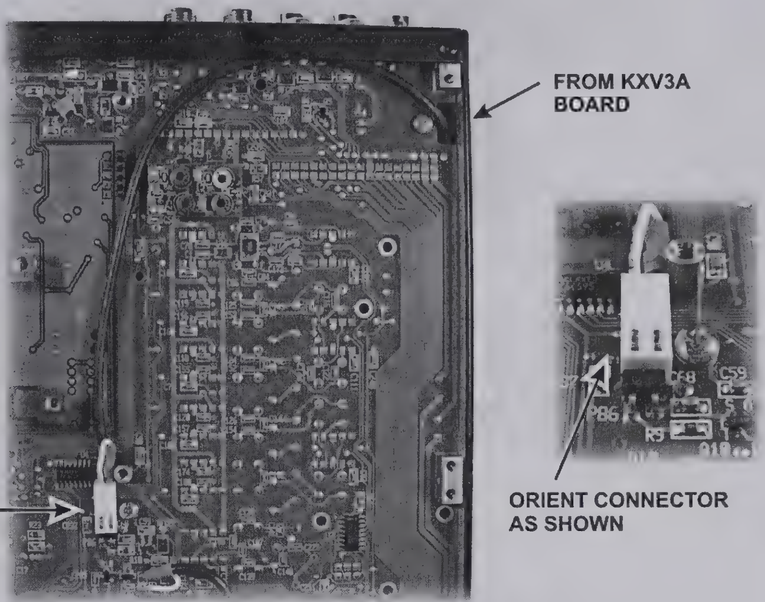


Figure 12. Routing KXV3A Cable to P86.

SPECIAL NOTE TO KIT BUILDERS: If you were directed here to install your KXV3A module as part of the overall kit assembly, installation of the KXV3A module is complete. Return to the K3 Kit Assembly Manual where you left off.

Reinstalling the KIO3 Board

☐ Replace both bottom covers using the 4-40 black pan head screws you removed earlier. Note that three locations take the 4-40 1/4” (6.4 mm) black pan head screws with lock washers as shown in Figure 6, while the remainder are 4-40 3/16” (4.8 mm) screws. Be sure to replace these screws in the correct locations. Make sure all the screws are secure, but do not over tighten them/

CAUTION!

Failure to replace the three 1/4” (6.4 mm) screws with their lock washers in the locations shown in Figure 6 may destroy power transistors in your K3!

☐ Check the KIO3 board and ensure the screws holding the two standoffs are tight. Also check to ensure the connector on the audio I/O daughter board is fully mated with J91 on the KIO3 Main board (see Figure 13).

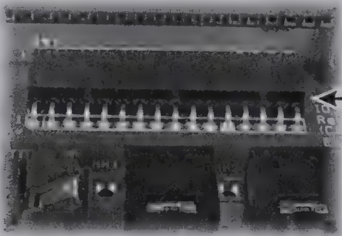
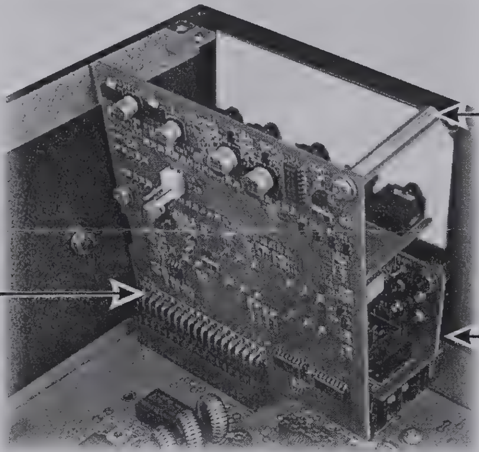

BE SURE THE CONNECTORS ARE FULLY MATED

Figure 13. Check KIO3 Audio I/O Board Mating.

☐ Replace the KIO3 Main Board with the audio I/O daughter board attached in the K3 as shown in Figure 14. The audio I/O board fits just over the KXV3A board assembly and the TMP cable passes through the space between the edge of the KXV3A board and the KIO3 board. Ensure the KIO3 connectors are fully mated so the standoffs line up with the holes in the rear panel.


TILT BOARD JUST ENOUGH FOR THE STANDOFF TO CLEAR THE LIP ON THE REAR PANEL

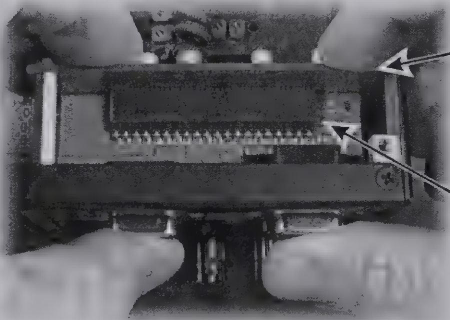
BE SURE CONNECTORS ARE ALIGNED WITH ALL PINS ENGAGED WHEN BOARD IS FULLY SEATED

KXV3A BOARD ASSEMBLY

Figure 14. Installing KIO3 Main Board.

☐ Plug the KIO3 digital I/O daughter board into the KIO3 main board as shown in Figure 15. Be careful to support the KIO3 main board as shown while pressing the daughter board in place.

⚠ ESD SENSITIVE!


SUPPORT THE KIO3 MAIN BOARD WHILE PRESSING THE DIGITAL I/O BOARD IN PLACE.

BE SURE THE PINS ARE PROPERLY ALIGNED AND THE CONNECTORS ARE FULLY MATED

Figure 15. Installing the KIO3 Digital I/O Board.

☐ Replace the screws in the digital I/O daughter board panel as shown in Figure 16.

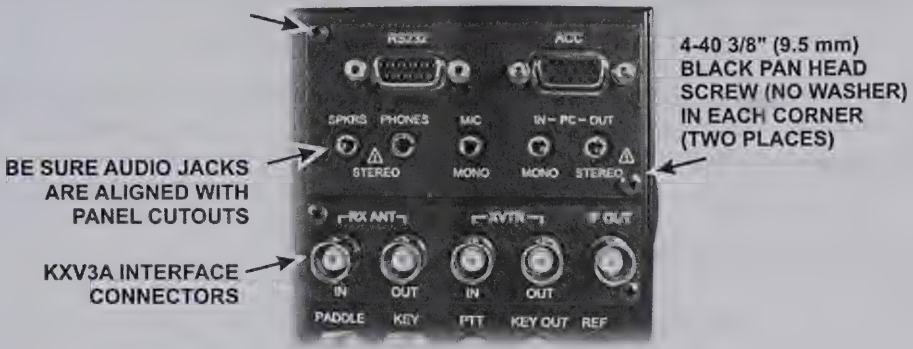


Figure 16. Mounting the Digital I/O Board and Rear Panel.

☐ If your K3 is equipped with the KRX3 sub receiver, turn to your *KRX3 Sub Receiver Installation and Operation* manual, *Installing the KRX3 Sub Receiver Module* section to replace the KRX3 module. Be especially careful to do the following as described in that procedure:

- Be sure the cover on battery BT1 on the K3 RF board is in place. The cover is essential to avoid shorting the battery. The outer rim of the battery is the positive terminal, and may come in contact with the grounded bottom of the KRX3 enclosure if the cover is not in place.
- Be sure all the TMP cables are properly connected or your K3 will not operate properly.
- Be sure the TMP cable to J85 on the sub receiver module is routed as shown to prevent signal leakage between the KRX3 and the K3 main receiver.

☐ If your K3 is equipped with the K144XV option and you removed the K144XV module earlier, replace it and the stiffening bar that runs across the top of the K3 now. Refer to your K144XV manual for instructions for reconnecting the power and coaxial cables and replacing the module cover. If you find more cables than shown in the K144XV manual, your unit has the K144 Reference Oscillator Phase Lock option installed. Refer to that manual to connect the remaining cables.

Replacing the Top Cover

☐ Route the speaker wire under the stiffener bar and plug it into the KIO3 board as shown in Figure 17. If your K3 has the K144XV 2-meter option, route the speaker cable under the stiffener bar at the depression in the top of the K144XV module as shown in the figure.

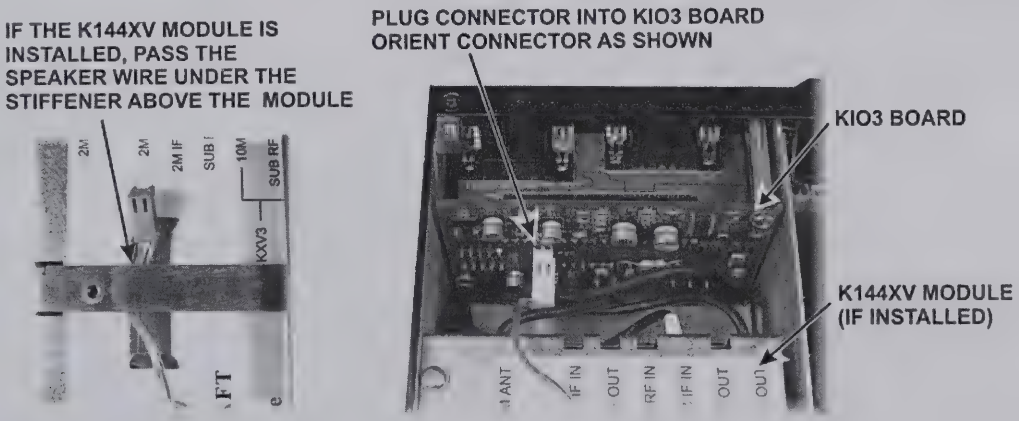


Figure 17. Connecting Speaker Cable.

☐ Position the top cover on the K3. Note that the tab on the back center goes under the rear lip of the K3 rear panel. Secure the top cover with the nine 4-40 3/16" (4.8 mm) black flat head screws you removed earlier.

⚠ REPLACE ALL THE SCREWS!

The K3's chassis has excellent rigidity despite its light weight. The screws that hold the top cover in place are an important part of the structural design. Please be sure to replace all the screws and verify they are tight whenever you replace the cover or other panels

Enabling the KXV3A Module

⚠ Your KXV3A will not operate correctly until the following steps are completed!

☐ Reconnect power to your K3 and turn it on.

☐ Refer to your Owner's manual and enable the KXV3A as described under *Configuration, Option Module Enables*.

☐ Perform the Transmitter Gain Calibration as follows. **This is essential for your KXV3A to operate properly with a transverter or any equipment using the RF output**.
If you do not have a computer, perform the manual *Milliwatt TX Gain Calibration* procedure in the *Calibration Procedures*, *Transmitter Gain* section of your Owner's manual.

If you have a Windows, Linux or Macintosh computer with an RS232 interface and cable, and an internet connection, perform the automated TX Gain calibration using the K3 Utility program as follows:

- Ensure you have the Elecraft K3 Utility Ver. 1.1.12.29 or later on your computer. The utility is available for downloading from the Elecraft web site: www.elecraft.com
- Connect your computer to your K3's RS232 port and start the K3 Utility program.
- Click on the K3 Utility "Configuration" tab, "Calibrate Transmitter Gain…" and follow the instructions to perform the 1 Milliwatt Transmitter Gain Calibration procedure.

That completes the installation of the KXV3A interface in your K3 transceiver.

ELECRAFT®
APP POWER SUPPLY CABLE KIT

Revision B, February 5, 2008

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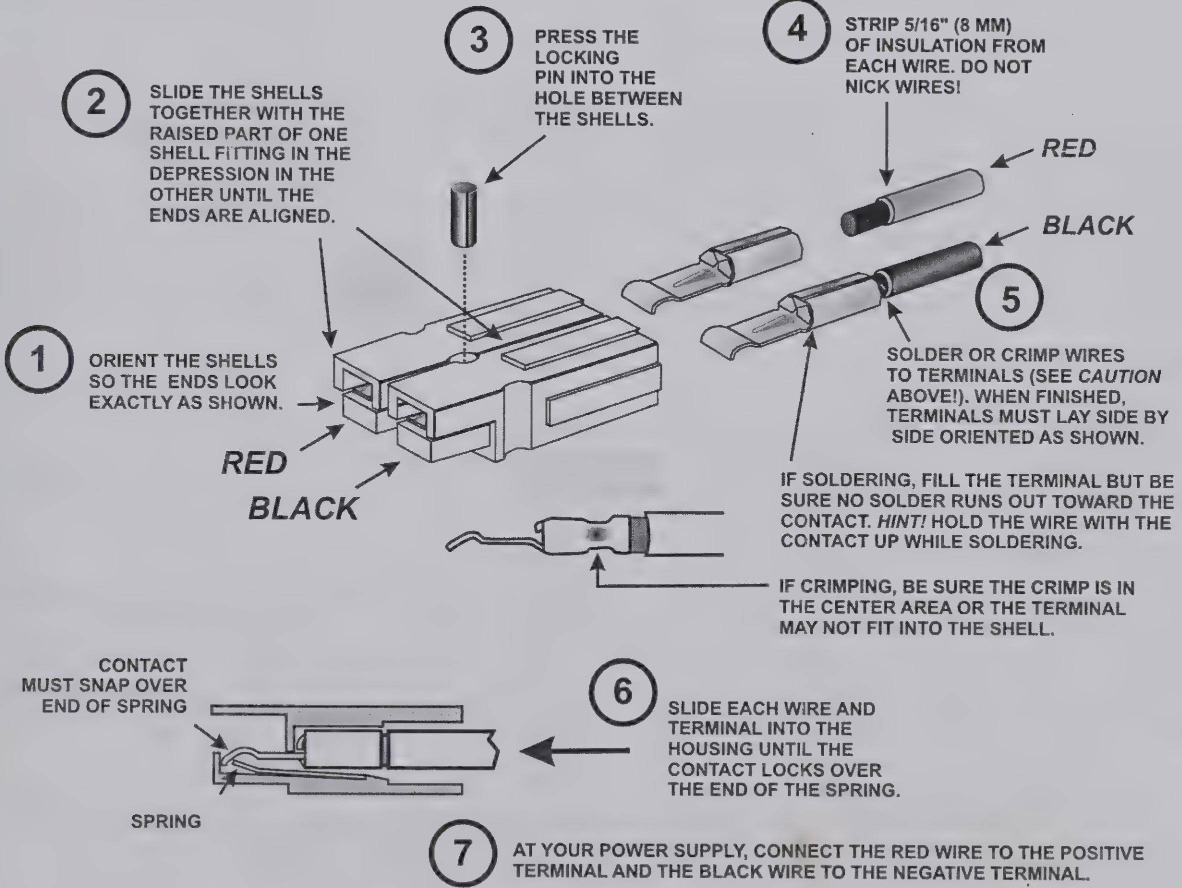
This kit provides the parts needed to assemble a suitable power supply cable for any Elecraft product using Anderson PowerPole® (APP) connectors. You will need to provide suitable connectors to attach the cable to your power supply. The kit contains the following parts:

1. Five feet of red/black two-wire stranded cable, 12 gauge.
2. Two 30-amp PowerPole terminals.
3. Two connector shells, one red and one black.
4. Locking pin.

ASSEMBLY PROCEDURE

CAUTION: If the terminals are not properly attached to the wires, the APP connector may overheat, possibly damaging your rig, your power supply or the cable. The terminals are designed to be soldered or crimped, but crimping requires the proper tool and technique to provide the low-resistance connection needed. Unless you have a high-quality crimping tool and experience using it, we strongly recommend you solder the terminals. A suitable tool is the West Mountain Radio PWRCrimp Powerpole Crimp tool with a #02 die[1].



③ PRESS THE LOCKING PIN INTO THE HOLE BETWEEN THE SHELLS.

④ STRIP 5/16" (8 MM) OF INSULATION FROM EACH WIRE. DO NOT NICK WIRES!

② SLIDE THE SHELLS TOGETHER WITH THE RAISED PART OF ONE SHELL FITTING IN THE DEPRESSION IN THE OTHER UNTIL THE ENDS ARE ALIGNED.

① ORIENT THE SHELLS SO THE ENDS LOOK EXACTLY AS SHOWN.

⑤ SOLDER OR CRIMP WIRES TO TERMINALS (SEE *CAUTION* ABOVE!). WHEN FINISHED, TERMINALS MUST LAY SIDE BY SIDE ORIENTED AS SHOWN.

IF SOLDERING, FILL THE TERMINAL BUT BE SURE NO SOLDER RUNS OUT TOWARD THE CONTACT. *HINT!* HOLD THE WIRE WITH THE CONTACT UP WHILE SOLDERING.

IF CRIMPING, BE SURE THE CRIMP IS IN THE CENTER AREA OR THE TERMINAL MAY NOT FIT INTO THE SHELL.

⑥ SLIDE EACH WIRE AND TERMINAL INTO THE HOUSING UNTIL THE CONTACT LOCKS OVER THE END OF THE SPRING.

⑦ AT YOUR POWER SUPPLY, CONNECT THE RED WIRE TO THE POSITIVE TERMINAL AND THE BLACK WIRE TO THE NEGATIVE TERMINAL.

® PowerPole is a registered trade mark of Anderson Power Products.

[1] www.westmountainradio.com/PWRcrimp.htm

Unpacking and Inventory

CAUTION

Do not handle the circuit boards without anti-static protection! Doing so may damage sensitive components. See *Preventing Electrostatic Discharge Damage* on page 3 for important information before proceeding.

Before starting construction, do a complete inventory, comparing the parts in your kit with the parts list in Appendix A, to familiarize yourself with all of the parts and to ensure the kit is complete. When inventorying, look in the sealed envelopes to identify their contents, but not mix them up. Some screws are very similar in length, but must be used in the correct locations described in the procedure to avoid damaging your K3. A paper clip or piece of tape will hold the envelopes closed after you check their contents. Note that a few extras of some screws, nuts and washers may have been included on purpose.

All dimensions given in the assembly procedure are provided in both US customary (often called English) and metric measurements. The native dimensions of the parts are in US Customary units. Approximate metric equivalents are given to assist those more familiar with that system to identify the correct parts.

Screws

A number of different types and sizes of screws and washers are used in the assembly. It is very important that you use the screw specified in each location or your finished K3 may not fit together properly. In some places, using the wrong size screw may damage components. The following various screw types and sizes specified in the text are shown in Figure 2. Images are shown for comparing relative sizes. They are not to scale. The lengths of the screws called for in the text are measured as shown.

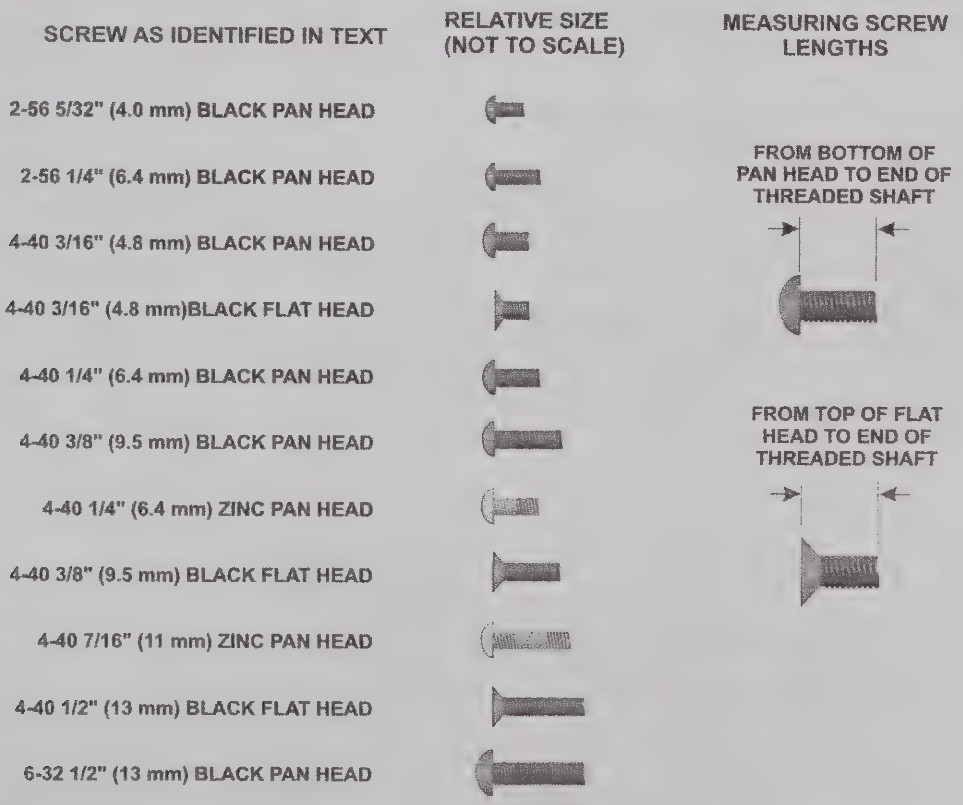

SCREW AS IDENTIFIED IN TEXT
RELATIVE SIZE (NOT TO SCALE)
MEASURING SCREW LENGTHS
2-56 5/32" (4.0 mm) BLACK PAN HEAD
2-56 1/4" (6.4 mm) BLACK PAN HEAD
4-40 3/16" (4.8 mm) BLACK PAN HEAD
4-40 3/16" (4.8 mm)BLACK FLAT HEAD
4-40 1/4" (6.4 mm) BLACK PAN HEAD
4-40 3/8" (9.5 mm) BLACK PAN HEAD
4-40 1/4" (6.4 mm) ZINC PAN HEAD
4-40 3/8" (9.5 mm) BLACK FLAT HEAD
4-40 7/16" (11 mm) ZINC PAN HEAD
4-40 1/2" (13 mm) BLACK FLAT HEAD
6-32 1/2" (13 mm) BLACK PAN HEAD
FROM BOTTOM OF PAN HEAD TO END OF THREADED SHAFT
FROM TOP OF FLAT HEAD TO END OF THREADED SHAFT

Figure 2. Screw Sizes Used in Assembly.

ELECRAFT

125 Westridge Drive
Watsonville CA 95076
www.elecraft.com

Invoice

Ship Date	Invoice #
3/9/2017	145744

Bill To

W9ADJ
James Beyer
6213 Countryside Ln
Madison, WI 53705

Ship To

James Beyer
6213 Countryside Ln
Madison, WI 53705

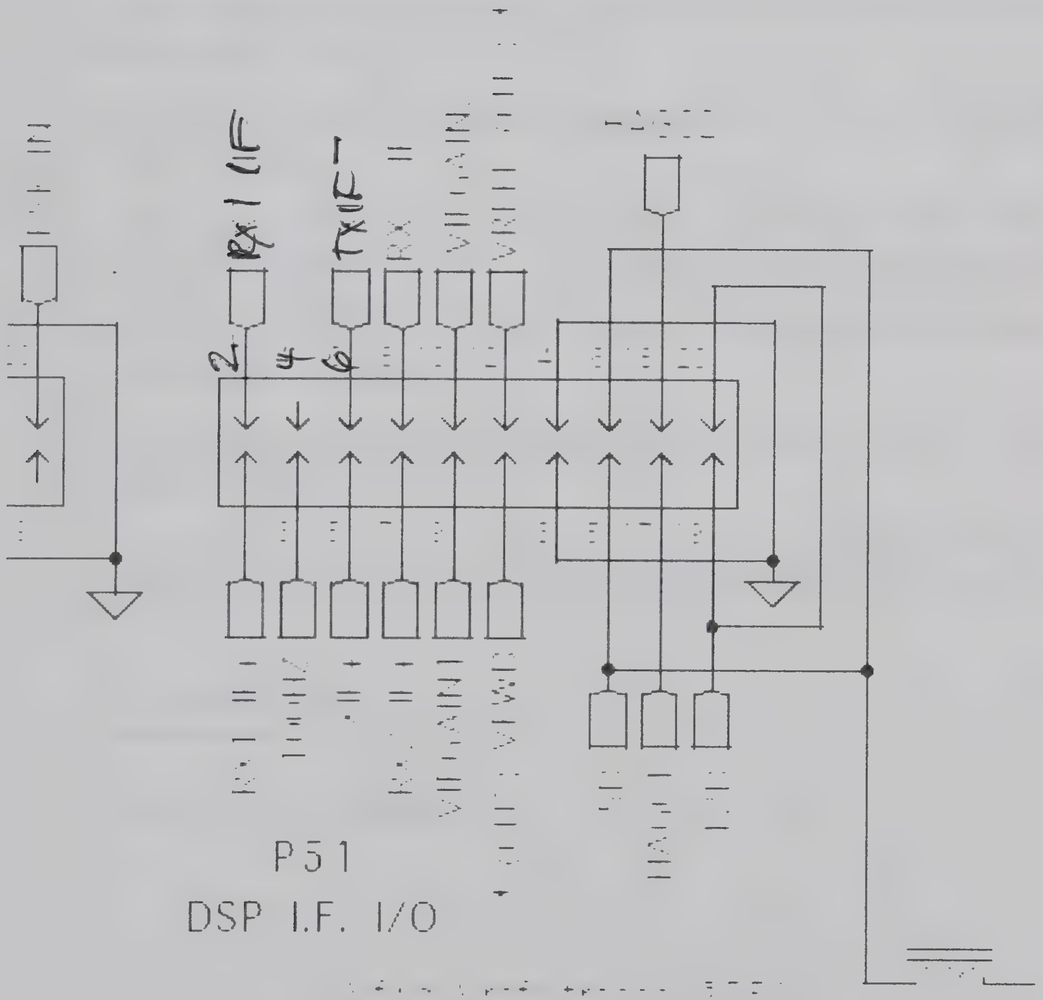
Order Number	Terms	Rep	Order Date	Via	F.O.B.	Call Sign
107263	Prepaid - CC	0317	3/7/2017	First Class	Watsonville	W9ADJ

Quantity	Item Code	Description	Price Each	Amount
1	Misc Parts	E980088 Knob,0.55" D,.236" Shaft,Blk	0.00	0.00T
1	Misc Parts	E620059 ANDERSON POWER POLE,RED	1.08	1.08T
1	Misc Parts	E620060 ANDERSON POWER POLE,BLACK	0.96	0.96T
1	Misc Parts	E620062 CRIMP/SOLDER,TERM,ANDERSON PWR	0.64	0.64T
1	Misc Parts	E700071 3/32"Dia, Roll pinm, 1/4L, ZN	0.18	0.18T
1	Shipping & Handling	Shipping	4.80	4.80T

Subtotal	$7.66
Sales Tax (0.0%)	$0.00
Total	$7.66

Gary Surrency <gary@elecraft.com>
Re: W9ADJ Re: k3 kit problem (invoice # 118582)
November 11, 2014 4:46:31 PM CST
jbbeyer <beyer@engr.wisc.edu>
1 Attachment, 20.1 KB

Check also at RF board connector P51 that comes from the DSP board, pin 6 (TXIF-). TXIF+ is not used.



Warning! Take all RF readings from the top of the radio, and do not transmit if the bottom rear panel is removed since it is a heat sink for the LPA power transistors. Use care to not let the probe or its ground clip slip off and damage any circuits.

Here are some typical RF voltage readings:

111mV RMS at the center pin of coax jumper from the KREF2 board, that goes into RF board connector J65. Remove the cable from the J65 connector and test at the tip of the plug. This is the earliest source of the transmitter's signal, and is at 8.215MHz.

37mV RMS (or more) on the right pin on both sides of the crystal filter pins. Low RF output will make this and other levels higher than normal, due to the TX ALC action.

346mV RMS at the BPIF jumper to the left of the KNB3 board. The operating frequency is here.

189mV RMS at jumper W4 near the KIO3. This may be a jumper wire that is plugged into J64A on later sn. K3s.

176mV RMS at P71A pin 3 on the LPA.This is near the left rear of the LPA, right across from the KIO3 board. Pin 1 is to the rear.

15.5V RMS at P71C pin 1 on the LPA. This connector is at the rear of the LPA board. Pin 1 is on the left.

If the K3 has a KXV3 option installed, you can set the KXV3 menu to "test" mode, then press TUNE and look for about 1.50mW on the front panel, and also at the XVTR OUT BNC jack on the rear panel and the KXV3. The signal frequency here will be the same as the VFO is set to, and is the output of the band pass filter just before it goes into the t-r switch and the LPA input.

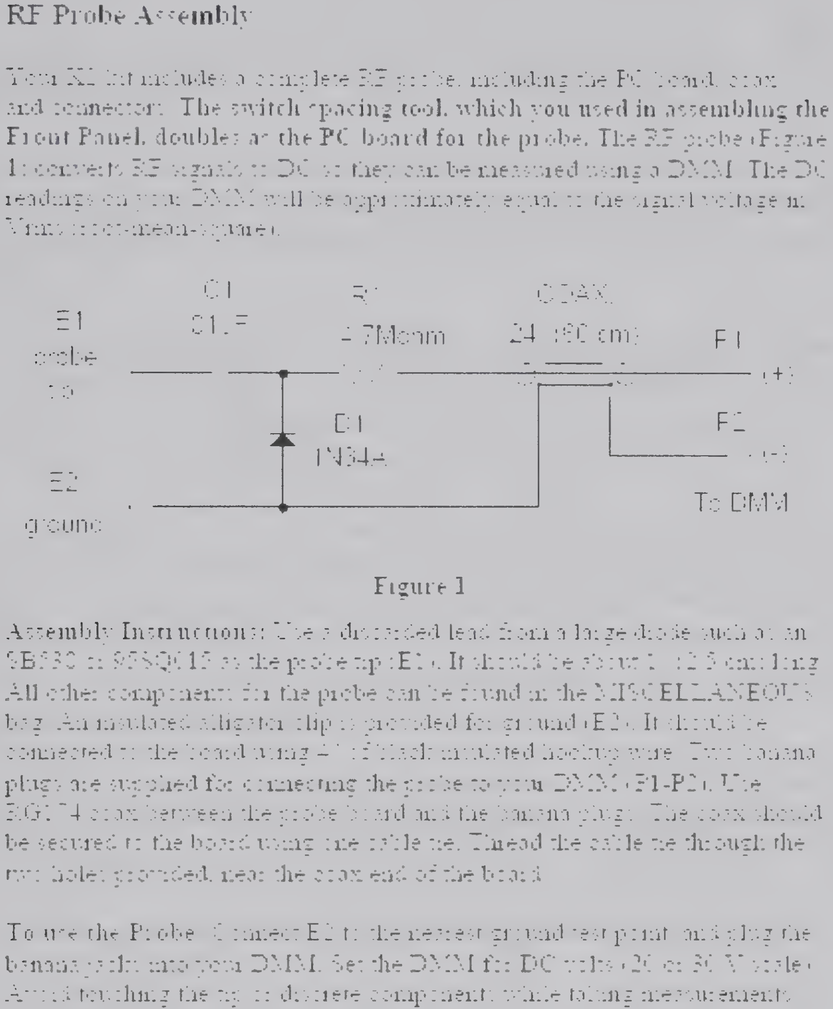
Be sure there is no damage to the small Band Stop Filter board, next to the LPA on the bottom of the RF board.

If not already done, you can examine the parts and connections under the RF Board in the band pass filter area, to see if there are any poorly soldered or damaged parts.

--
73, Gary AB7MY
==========

Elecraft Technical Support

If you have an RF probe (and it is easy to make one, see the info from our K2 kit below), you could do the tests shown below:



RF Probe Assembly

Your K2 kit includes a complete RF probe, including the PC board, coax and connectors. The switch spacing tool, which you used in assembling the Front Panel, doubles as the PC board for the probe. The RF probe (Figure 1) converts RF signals to DC so they can be measured using a DMM. The DC readings on your DMM will be approximately equal to the signal voltage in Vrms (root-mean-square).

Figure 1

Assembly Instructions: Use a discarded lead from a large diode such as an SB530 or 95SQ015 as the probe tip (E1). It should be about 1" (2.5 cm) long. All other components for the probe can be found in the MISCELLANEOUS bag. An insulated alligator clip is provided for ground (E2). It should be connected to the board using 4" of black insulated hookup wire. Two banana plugs are supplied for connecting the probe to your DMM (P1-P2). Use RG174 coax between the probe board and the banana plugs. The coax should be secured to the board using one cable tie. Thread the cable tie through the two holes provided, near the coax end of the board.

To use the Probe: Connect E2 to the nearest ground test point, and plug the banana jacks into your DMM. Set the DMM for DC volts (20 or 50 V scale). Avoid touching the tip or discrete components while taking measurements.

You need to check the TX RF signal level going into and out of the band pass filters to see if there is too much loss there, or if the problem is too little signal coming from the crystal filter and the TXIF output of the KREF3 board.

Here is what I see on my K3 on 160m, 1850kHz, at 5w in TUNE mode, using the RF probe from our K2 kit. You can try other bands for comparison too.

If using an oscilloscope, convert these RMS readings to peak to peak by multiplying by a factor of 2.8.

ELECRAFT

Thank you for purchasing our P3 Pandapter. We hope you enjoy your P3 as much as we have enjoyed designing it.

For kit builders, please be sure to **perform a complete parts inventory before building**. If you are missing any parts please email us at: k3support@elecraft.com or telephone us and we will get them in the mail to you immediately. *(Make sure to include your name and callsign whenever you contact us.)*

For technical help with your P3 please email k3support@elecraft.com for a quick response. This is a special K3 and K3 related products support email address that goes to our whole K3 support group. Please use it for problems, questions, parts shortages, suggestions and comments. If you do not have Internet capability, please feel free to telephone us.

For the latest P3 information, Builder Alerts, application notes, building tips and user feedback you can check our **Builder's Resource Page**, located at www.elecraft.com , and also the Elecraft email list. The email list is a great place to ask questions of other Elecraft product builders and to watch for the latest P3 announcements. To subscribe to the Elecraft email list or read its archives on the web (an excellent way to get fast answers to all of your questions) go to http://www.elecraft.com/elist.html

After receiving your P3, please check our web site for the latest manuals and firmware with new P3 features. Please see: ftp://ftp.elecraft.com/P3/firmware/. That is where you will find our P3 PC Downloader Program that will check for and download the latest firmware for your P3.

If you are using your P3 with a K3, you must update your K3's firmware to at least MCU rev 4.05 and DSP rev 2.60.

Again, we hope you enjoy your P3. Have fun!

73,

Wayne Burdick N6KR
Eric Swartz WA6HHQ

ELECRAFT, LLC Box 69, Aptos, CA 95001-0069
831-662-8345 FAX: 831-662-0830 www.elecraft.com

0803 Rev A

work.

You will need to update the K3 firmware to rev 4.68 or above and change a setting in the Configuration Menu. Locate the CONFIG:SPKR+PH menu entry. Next, tap the '1' switch on the numeric keypad until you see "PH.R SW-". The minus sign at the end indicates inverted switch logic for the jack on boards with the yellow dot. Tapping it again would restore the original setting ("PH.R SW+"). Exit the menu. We recommend you re-save your configuration using the K3 Utility.

⚠ **IMPORTANT! Read carefully or your new KIO3 Audio Board will not function properly.**

The yellow dot near one corner of the circuit board identifies those using a newer type of headphone jack that has inverted speaker cutoff logic compared to the original board. A firmware setting must be changed for the new board to work.

You will need to update the K3 firmware to rev 4.68 or above and change a setting in the Configuration Menu. Locate the CONFIG:SPKR+PH menu entry. Next, tap the '1' switch on the numeric keypad until you see "PH.R SW-". The minus sign at the end indicates inverted switch logic for the jack on boards with the yellow dot. Tapping it again would restore the original setting ("PH.R SW+"). Exit the menu. We recommend you re-save your configuration using the K3 Utility.

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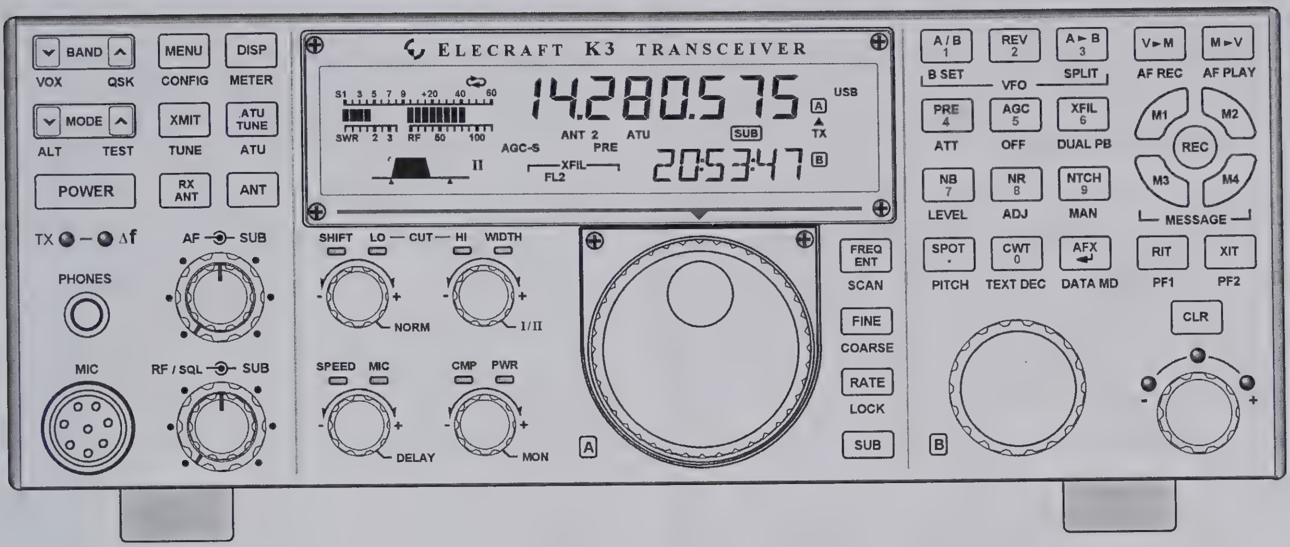

ELECRAFT® K3

HIGH-PERFORMANCE 160 – 6 METER TRANSCEIVER

KAT3 100-WATT AUTOMATIC ANTENNA TUNER INSTALLATION INSTRUCTIONS

Rev C, June 24, 2008

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Contents

Introduction 3
- Customer Service and Support 3
  - Technical Assistance 3
  - Repair / Alignment Service 3

Preventing Electrostatic Discharge Damage 4
- How ESD Damage Occurs 4
- Preventing ESD Damage 4

Preparing for Installation 5
- Tools Required 5
- Parts Included 5

Installation Procedure 6
- Removing the Top Cover 6
- Removing the KRX3 Subreceiver Module 6
- Removing the Right Side Panel 8
- Removing the KANT Module 9
- Installing the ANT2 Connector 10
- Installing the KAT3 Module 10
- Reinstalling the KRX3 Subreceiver Module 11
- Replacing the Top Cover 12

Enabling the KAT3 12

Introduction

The KAT3 option is an internally-mounted 100-watt automatic antenna tuner. Complete details for using the KAT3 are included in the K3 Owner's manual. This manual covers the installation of the KAT3 option in your K3 transceiver.

Only a few basic hand tools are needed (see page 5) to perform the installation. No soldering or wiring is required.

Customer Service and Support

Technical Assistance

You can send e-mail to support@elecraft.com and we will respond quickly - typically the same day Monday through Friday. Telephone assistance is available from 9 A.M. to 5 P.M. Pacific time (weekdays only) at 831-662-8345. Please use e-mail rather than calling when possible since this gives us a written record of the details of your problem and allows us to handle a larger number of requests each day.

Repair / Alignment Service *(We want to make sure everyone succeeds!)*

If necessary, you may return your Elecraft product to us for repair or alignment. (Note: We offer unlimited email and phone support to get your kit running, so please try that route first as we can usually help you find the problem quickly.)

IMPORTANT: You must contact Elecraft before mailing your product to obtain authorization for the return, what address to ship it to and current information on repair fees and turn around times. (Frequently we can determine the cause of your problem and save you the trouble of shipping it back to us.) Our repair location is different from our factory location in Aptos. We will give you the address to ship your kit to at the time of repair authorization. *Packages shipped to Aptos without authorization will incur an additional shipping charge for reshipment from Aptos to our repair depot.*

Elecraft 1-Year Limited Warranty

This warranty is effective as of the date of first consumer purchase. It covers both our kits and fully assembled products. For kits, before requesting warranty service, you should fully complete the assembly, carefully following all instructions in the manual.

What is covered: During the first year after date of purchase (or if shipped from factory, date product is shipped to customer), Elecraft will replace defective or missing parts free of charge (post-paid). We will also correct any malfunction to kits or assembled units caused by defective parts and materials. Purchaser pays inbound shipping to us for warranty repair, we pay shipping to return the repaired equipment to you by UPS ground service or equivalent to the continental USA and Canada. Alaska, Hawaii and outside U.S. and Canada actual return shipping cost paid by owner.

What is not covered: This warranty does not cover correction of kit assembly errors. It also does not cover misalignment; repair of damage caused by misuse, negligence, or builder modifications; or any performance malfunctions involving non-Elecraft accessory equipment. The use of acid-core solder, water-soluble flux solder, or any corrosive or conductive flux or solvent will void this warranty in its entirety. Also not covered is reimbursement for loss of use, inconvenience, customer assembly or alignment time, or cost of unauthorized service.

Limitation of incidental or consequential damages: This warranty does not extend to non-Elecraft equipment or components used in conjunction with our products. *Any such repair or replacement is the responsibility of the customer. Elecraft will not be liable for any special, indirect, incidental or consequential damages, including but not limited to any loss of business or profits.*

Preventing Electrostatic Discharge Damage

There is no climate or work location where the components of your K3 are safe from Electrostatic Discharge (ESD) unless you take specific steps to prevent such damage. Many of the components in your K3 can be damaged by static discharges of only a few volts: far too little for you to notice. It is those low-voltage but destructive discharges that easily happen anywhere and under virtually any environmental conditions.

ESD damage may not be apparent at first. The damaged components may not fail completely. Instead, the damage may result in below-normal performance for an extended period of time before you experience a total failure.

How ESD Damage Occurs

Whenever an object containing a static charge touches a circuit in your K3, current will rush into the circuit until the components reach the same voltage as the source of the static charge. If the voltage or current that passes through a component during that brief period exceeds its normal operating specifications, it may be damaged or destroyed.

Preventing ESD Damage

ESD damage cannot occur if there is no voltage difference between the components in your K3 and any object that touches them. That is how anti-static packaging works. Anti-static bags allow the static charge to flow over their surface, so that any part of the bag that touches the components inside are all at the same potential at all times. Anti-static foam keeps the leads of sensitive components at the same potential.

At your work bench, avoiding a dangerous voltage is achieved most easily by tying everything together and connecting them to a common mains safety ground. This includes your K3, individual boards or other sensitive components as well as everything they may touch at the work table.

Inexpensive static dissipating work mats are readily-available that will steadily and safely drain off any charges built up on parts or circuit boards placed on them. They are supplied with a lead that connects the mat to the common workbench ground. Also, metal cabinets on test equipment used on the bench should be tied together and connected to the common ground.

Most importantly, you must have a way of continuously draining off any static charges that occur on your body. Such charges are easy to create, even while sitting quietly at the work bench. Moving your feet on the floor, shifting position in your chair or even moving your arms so that clothing rubs against itself can produce destructive static charges. You can discharge yourself by touching an unpainted metal ground, but that will last only until you move in a way that produces a new static charge. The safest technique is to wear a grounded wrist strap with a series 1-megohm resistor that continuously drains off any charges. Such wrist straps are readily-available and inexpensive.

⚠ *WARNING*

DO NOT attach a ground directly to yourself without a current-limiting resistor as this poses a serious shock hazard. A wrist strap must include a 1-megohm resistor to limit the current flow. If you choose to touch an unpainted, metal ground to discharge yourself, do it only when you are not touching any live circuits with your other hand or any part of your body.

We strongly recommend you take the following anti-static precautions (listed in order of importance) to avoid trouble:

- Leave ESD-sensitive parts in their anti-static packaging until you install them. The packaging may be a special plastic bag or the component's leads may be inserted in conductive foam. Parts which are especially ESD-sensitive are identified in the parts list and in the assembly procedures.

- Wear a conductive wrist strap with a series 1-megohm resistor. If you do not have a wrist strap, touch a ground briefly before touching any sensitive parts to discharge your body. Do this frequently while you are working. You can collect a destructive static charge on your body just sitting at the work bench. **DO NOT attach a ground directly to yourself as this poses a serious shock hazard.**
- Use a grounded anti-static mat on your work bench.
- If you choose to use a soldering iron to work on your K3 for any reason, be sure your iron has an ESD-safe grounded tip tied to the same common ground used by your mat or wrist strap.

Preparing for Installation

Tools Required

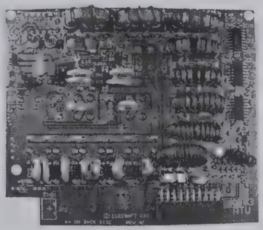
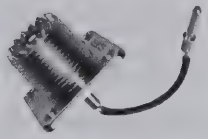
1. #0 and #1 size Phillips screwdrivers. To avoid damaging screws and nuts, a power screwdriver is ***not*** recommended. Use the screwdriver that best fits the screw in each step.
2. Small pliers or a 1/4" nut driver.
3. Soft cloth or clean, soft static dissipating pad to lay cabinet panels on to avoid scratching.

The following tools are strongly recommended:

1. ESD wrist strap.
2. Static dissipating work pad.

Parts Included

The following parts should be included in your kit. Check to ensure you have them all. If any parts are damaged or missing, contact Elecraft for replacements (see *Customer Service and Support*, page 3).

ILLUSTRATION	DESCRIPTION	QTY.	ELECRAFT PART NO.
	KAT3 Printed Circuit Board Assembly ⚠ ***ESD Sensitive. Follow ESD safe handling procedures. Keep in ESD-safe bag until installed.***	1	E850274
	SO239 Connector with cable	1	E850229
	Screw, Black, 4-40, 1/4" (6.4 mm)	2	
	Lockwasher, 4-40, inside tooth	2	
	Nut, 4-40	2	

Installation Procedure

Removing the Top Cover

☐ Disconnect power and all cables from your K3.

☐ Remove the nine screws to free the top cover as shown in Figure 1. After the cover is open, lift it gently to reach the speaker wire connector. Unplug the speaker then set the top cover aside in a safe place.

> ⚠ **Whenever you remove screws from a panel, if one screw seems too tight to loosen without damaging it, first loosen the other screws then try again. Sometimes one screw binds in its hole when the other screws are tightened.**

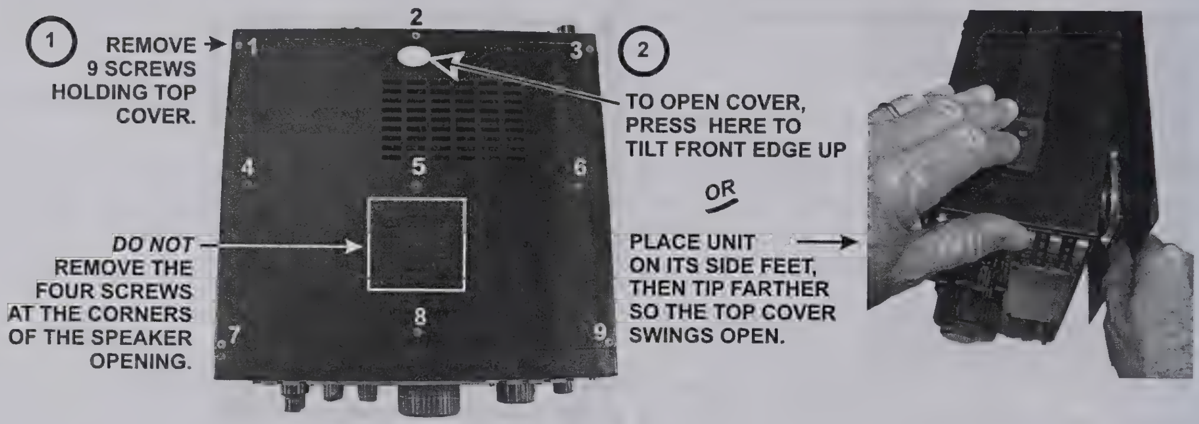

①
REMOVE 9 SCREWS HOLDING TOP COVER.
1
2
3
4
5
6
7
8
9
②
TO OPEN COVER, PRESS HERE TO TILT FRONT EDGE UP
OR
PLACE UNIT ON ITS SIDE FEET, THEN TIP FARTHER SO THE TOP COVER SWINGS OPEN.
DO NOT REMOVE THE FOUR SCREWS AT THE CORNERS OF THE SPEAKER OPENING.

Figure 1. Removing K3 Top Cover.

> ⚠ CAUTION: **Touch an unpainted metal ground or wear a grounded wrist strap before touching components or circuit boards inside the K3. See *Preventing ESD Damage* on page 4 for more information.**

Removing the KRX3 Subreceiver Module

If your K3 is equipped with the optional KRX3 Subreceiver, you must remove the subreceiver module to install the KAT3. The KRX3 subreceiver module is the "L" shaped metal enclosure (see Figure 2). Remove the subreceiver module as follows:

☐ Remove the chassis stiffener bar that runs across the top of the K3 chassis and is attached to the side panels. If the KPA3 is installed, the stiffener will be attached to the KPA3 shield by two screws. These screws may have nuts and lock washers or they may thread into permanently-attached PEM nuts on the stiffener bar.

☐ Remove the two 1-1/2” (38 mm) screws and lock washers shown in Figure 2. These screws extend all the way through the KRX3 module and secure it to standoffs mounted on the main RF board that fills the bottom of the K3.

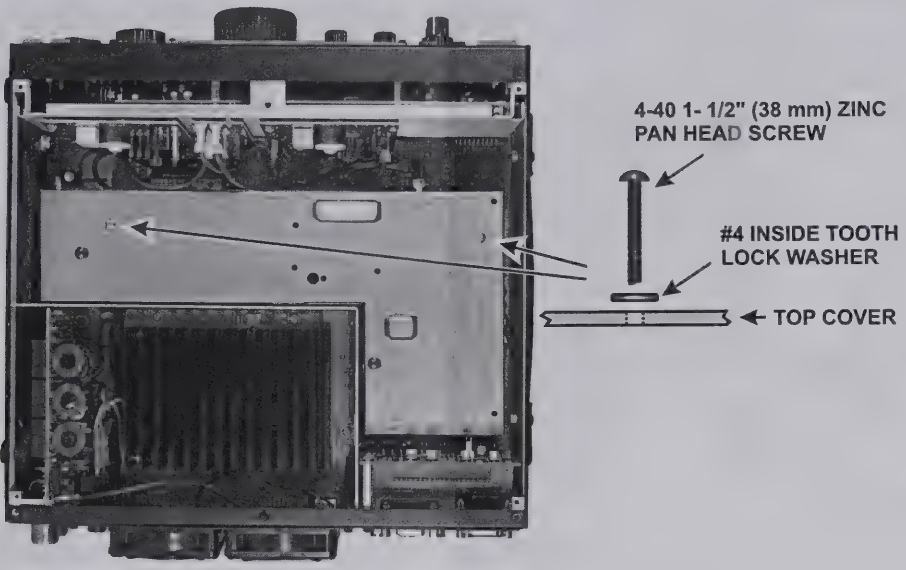

4-40 1- 1/2" (38 mm) ZINC PAN HEAD SCREW
#4 INSIDE TOOTH LOCK WASHER
TOP COVER

Figure 2. Removing the KRX3 Module.

⚠ **In the following steps you will handle small TMP coaxial connectors. These are friction-fit connectors shown in Figure 3. Handle the connectors by the grips as shown. *Do not pull on the coaxial cable.***

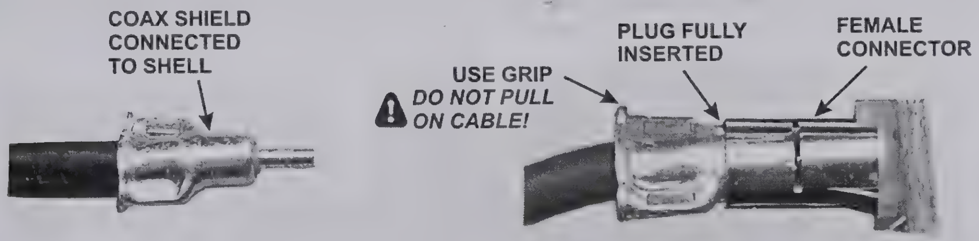


Figure 3. TMP Cable Connectors.

☐ Hold the KRX3 module by the two brass knurled nuts on the top, and lift it straight up to gain access to the small TMP coaxial connectors plugged into the module. There are two along the front. There may be one at the back as well, depending upon the options installed. As you lift the KRX3 module, it will unplug from two small interface circuit boards. One is at the front and the other is at the rear. These small boards may come out with the module or they may remain attached to the K3 main RF board.

☐ Unplug the TMP coaxial cables leading to the KRX3 module, then lift the module free and set it aside.

☐ Locate the two small interface circuit boards, remove them and put them in a safe place.

Removing the Right Side Panel

☐ Remove the hardware securing the heat sinks of U13 and U12 to the right side panel (see Figure 4). Be careful not to lose the lock washers inside the K3.

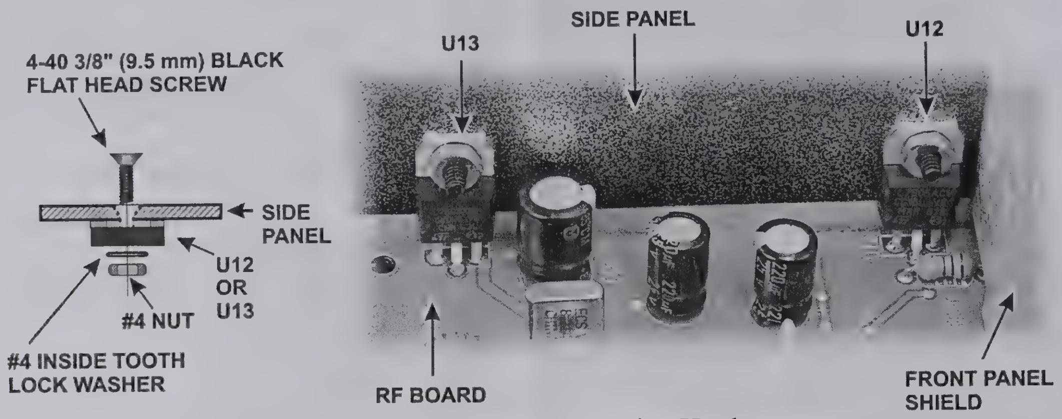


Figure 4. U13 and U12 Mounting Hardware.

☐ Remove the screw holding the KANT3 board to the standoff and the screw holding the 2D fastener to the rear panel near the SO239 antenna connector shown in Figure 5. Do not lose the lock washer inside the K3. It is easier to keep the hardware from falling inside if you set the K3 on its side feet and remove the screw and lock washer holding the KANT3 board first, then set it on its bottom feet and remove the flat head screw from the 2D fastener.

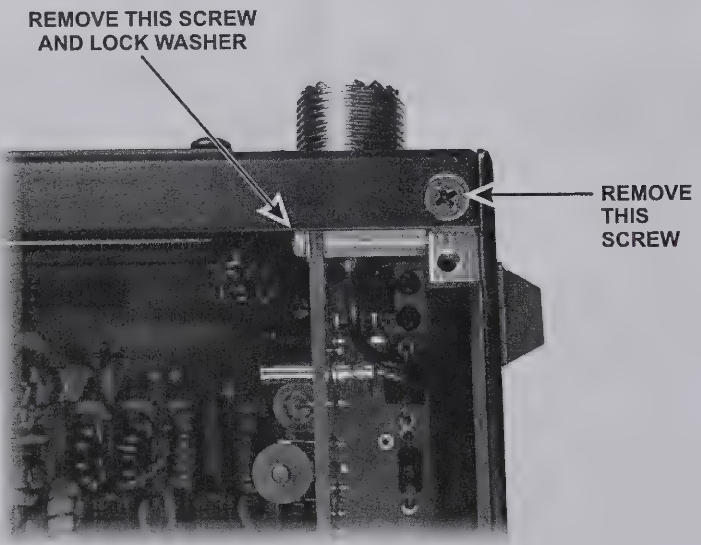


Figure 5. Removing Side Panel Hardware Part 1.

☐ Remove the five screws shown in Figure 6 from the right side panel to release it. The side panel will lift off with the 2D fastener and standoff shown in Figure 5 attached.

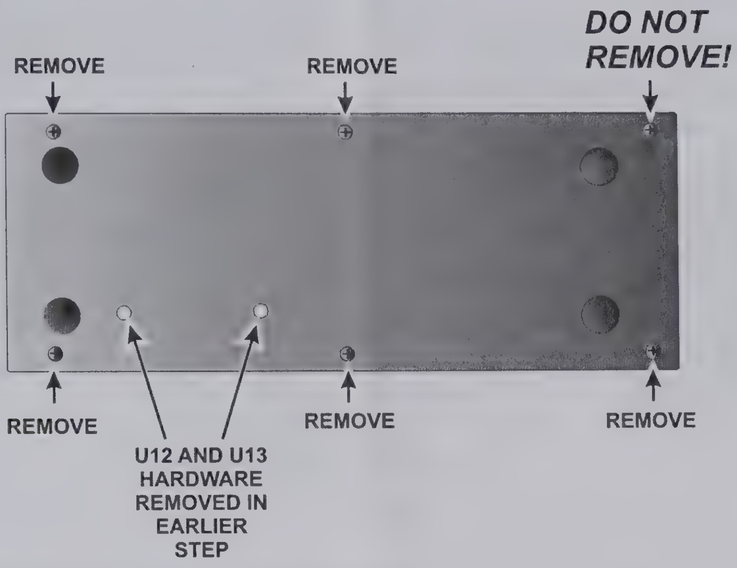


Figure 6. Removing Side Panel Hardware, Part 2.

Removing the KANT Module

☐ Unplug the antenna connection to the KANT3 board (see Figure 7) then unplug the KANT3 from the RF board and lift it out. Flex the back panel outward slightly as needed to clear the edge of the board. Holding the KANT3 board at the top corners, rock it back and forth as needed to release the connector.

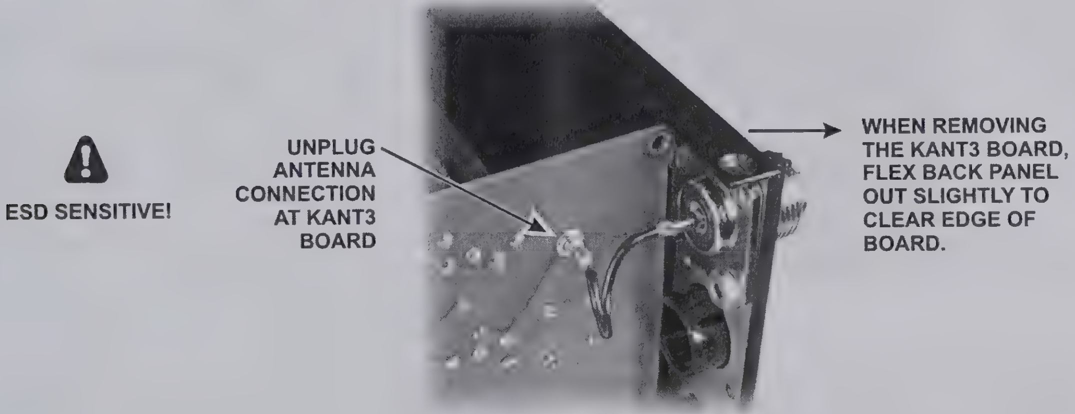

ESD SENSITIVE!
UNPLUG ANTENNA CONNECTION AT KANT3 BOARD
WHEN REMOVING THE KANT3 BOARD, FLEX BACK PANEL OUT SLIGHTLY TO CLEAR EDGE OF BOARD.

Figure 7. Removing KANT3 Board.

Installing the ANT2 Connector

☐ Remove the dummy plug from the ANT2 connector hole in the back panel. The plug is released by squeezing two tabs on opposite sides (see Figure 8).

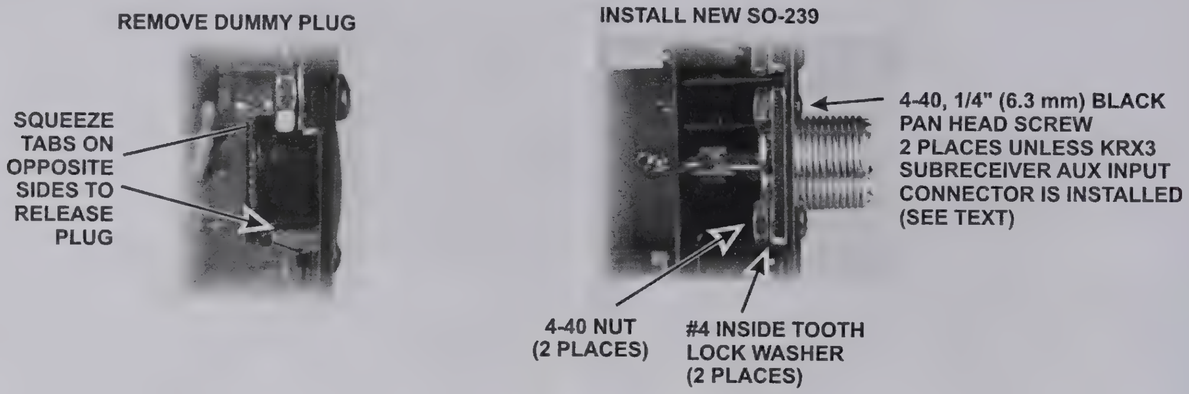

REMOVE DUMMY PLUG
SQUEEZE TABS ON OPPOSITE SIDES TO RELEASE PLUG
INSTALL NEW SO-239
4-40, 1/4" (6.3 mm) BLACK PAN HEAD SCREW 2 PLACES UNLESS KRX3 SUBRECEIVER AUX INPUT CONNECTOR IS INSTALLED (SEE TEXT)
4-40 NUT (2 PLACES)
#4 INSIDE TOOTH LOCK WASHER (2 PLACES)

Figure 8. Installing ANT2 Connector.

☐ Install the SO239 coaxial connector in the ANT2 space using the hardware shown in Figure 8.If the KRX3 AUX RF connector is installed, remove the 3/8" (9.5 mm) black pan head screw and associated hardware from the lower hole, then use the same screw to replace the AUX RF ground lug as shown in Figure 9

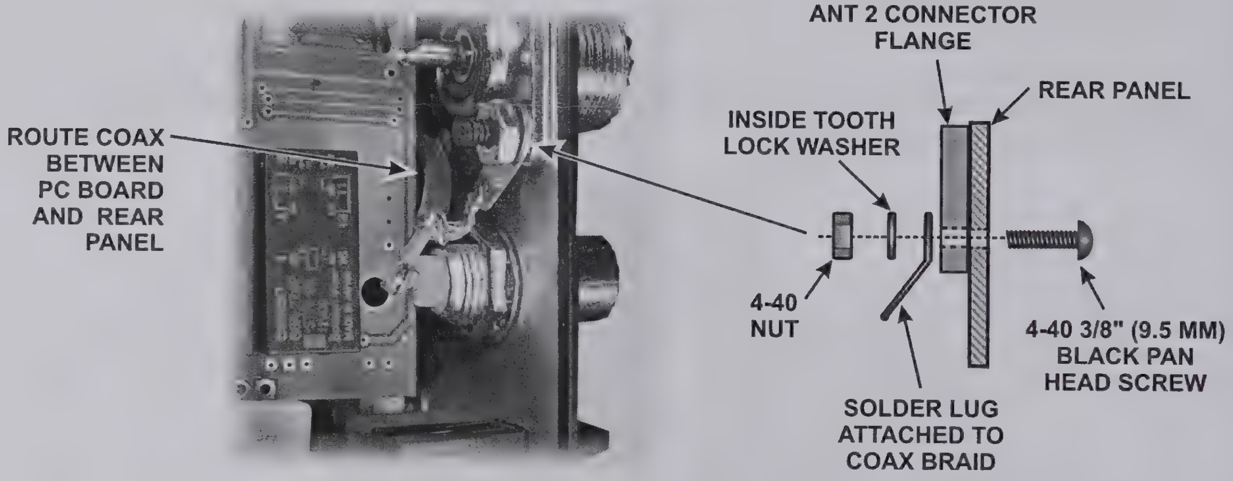

ROUTE COAX BETWEEN PC BOARD AND REAR PANEL
ANT 2 CONNECTOR FLANGE
REAR PANEL
INSIDE TOOTH LOCK WASHER
4-40 NUT
4-40 3/8" (9.5 MM) BLACK PAN HEAD SCREW
SOLDER LUG ATTACHED TO COAX BRAID

Figure 9. Installing AUX RF Ground Lug.

⚠ As you install components and reassemble your K3, be sure all the screws are in place and secure, but do not over tighten them. Failure to tighten all screws may result in poor shielding of sensitive components, resulting in possible noise or birdies in the receiver as well as other difficult-to-trace problems.

Installing the KAT3 Module

☐ Plug the KAT3 board into P70 on the RF board. This is the same plug that was used by the KANT3. **Wear a wrist strap or touch an unpainted metal ground before handling the boards.** Flex the back panel slightly as needed for the board to clear the lip at the top, just as you did when removing the KANT3 board. If the AUX RF connector is installed, route the coaxial cable between the KAT3 board and rear panel as shown in Figure 9.

☐ Plug the connectors on the wires leading to the ANT1 and ANT2 jacks into the KAT3 board as shown in Figure 10. ANT1 goes to the connector nearest the rear panel, and ANT2 goes to the one farthest from the rear panel as shown. Support the top of the KAT3 board when plugging in these connectors. The fit may be very tight and the KAT3 board does not have any mechanical support at the top yet.

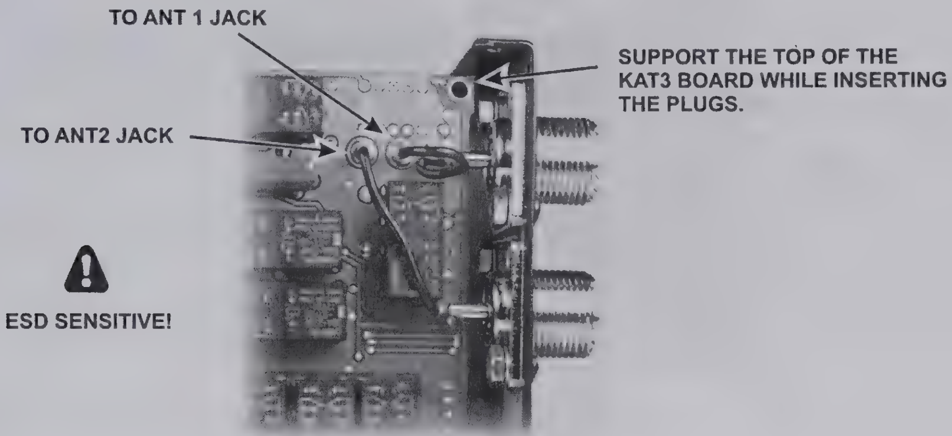

TO ANT 1 JACK
SUPPORT THE TOP OF THE KAT3 BOARD WHILE INSERTING THE PLUGS.
TO ANT2 JACK
ESD SENSITIVE!

Figure 10. Installing the KAT3 Board.

☐ Replace the right side panel on the K3, installing the screws shown in Figure 6 first. Use the 4-40 3/16" (4.8 mm) screws you removed earlier.

☐ Replace the 4-40 1/4" (6.4 mm) zinc pan head screw and washer that holds the KAT3 board to the standoff as shown in Figure 5.

☐ Replace the 4-40, 3/16" (4.8 mm) black flat head screw that secures the back panel to the 2D fastener as shown in Figure 5.

☐ Replace the two 4-40 3/8" (9.6 mm) black flat head screws, lock washers and nuts to secure the heat sinks of U13 and U12 to the side panel as shown in Figure 4.

Reinstalling the KRX3 Subreceiver Module

If your K3 does not have a KRX3 subreceiver, go directly to *Replacing the Top Cover* on page 12.

☐ If your K3 is equipped with the KRX3 Subreceiver, turn to your *KRX3 Subreceiver Installation and Operation* manual, *Installing the KRX3 Subreceiver Module* section to replace the KRX3 module. Be especially careful to do the following as described in that procedure:

- _ Be sure the cover on battery BT1 on the K3 RF board is in place. The cover is essential to avoid shorting the battery. The outer rim of the battery is the positive terminal, and may come in contact with the grounded bottom of the KRX3 enclosure if the cover is not in place.
- _ Be sure all the TMP cables are properly connected or your K3 will not operate properly.
- _ Be sure the TMP cable to J85 on the subreceiver module is routed as shown to prevent signal leakage between the KRX3 and the K3 main receiver.

Replacing the Top Cover

☐ Hold the top cover above the K3, route the speaker wire under the stiffener bar and plug it into P25 on the KIO3 board at the left rear of the K3 as shown in Figure 11.

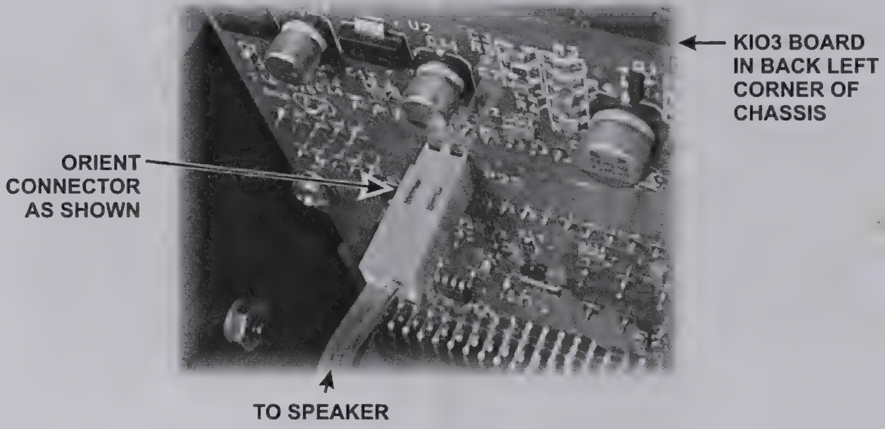


Figure 11. Connecting Speaker Cable.

☐ Position the top cover on the K3. Note that the tab on the back center goes under the rear lip of the K3 rear panel. Secure the top cover with the nine 4-40 3/16" (4.8 mm) black flat head screws you removed earlier.

⚠ REPLACE ALL THE SCREWS!

The K3's chassis has excellent rigidity despite its light weight. The screws that hold the top cover in place are an important part of the structural design. Be sure to replace all the screws and verify they are tight whenever you replace the cover or other panels

Enabling the KAT3

⚠ Your KAT3 will not operate correctly until the following steps are completed!

☐ Reconnect power and antenna (or dummy load) to your K3 and turn it on. Enable your KAT3 ATU using the **CONFIG** commands as described in the Owner's Manual.

This completes the installation of the KAT3 automatic antenna tuner in your K3.

ELECRAFT K3 OWNER'S MANUAL ERRATA

Rev. **D10-6**, June 10, 2014

REAR-PANEL HEADPHONE JACK MAY REQUIRE CONFIGURATION:

If you can't hear any audio from the speaker with both front and rear headphones unplugged, then the firmware may not be set up correctly for your rear-panel headphone jack. We're now using a newer type that has inverted speaker-cutoff switch logic. **KIO3 audio daughter boards with this new jack can be identified by a yellow dot in one corner of the bottom of the board.**

If you need to change the setting, first locate the CONFIG:SPKR+PH menu entry. Next, tap the '1' switch on the numeric keypad until you see "PH.R SW-". The minus sign at the end indicates inverted switch logic for the jack (corresponding to a yellow dot on the board). Tapping it again would restore the original setting ("PH.R SW+"). Exit the menu and re-save your configuration using *K3 Utility*.

CAUTION REGARDING THE EXTERNAL SPEAKER JACK:

✓ ok

This jack is stereo, not mono, because of the K3's stereo speaker outputs. If you use a mono speaker plug, turn off the right channel amplifier by setting the SPKRS configuration menu entry to 1. This will eliminate the possibility of damaging the right-channel amplifier. (You will still hear stereo when using headphones in this case, unless you also set the SPKR+PHones menu entry to YES.)

NEW FEATURE FOR USE WITH THE ELECRAFT KAT500:

The K3 can now send its VFO frequency to the KAT500 Automatic Antenna Tuner as the VFO is moved. This allows the KAT500 to automatically update its L-C network so that it is always ready for transmit on the current frequency. To enable this feature, locate the K3's CONFIG:KAT3 menu entry, then tap '1' to change the KAT500 setting to "KAT500Y" instead of "KAT500N" (the default).

IMPORTANT NOTE REGARDING THE K3EXREF MODULE:

- K3EXREF USERS MUST NOW ENABLE THE MODULE IN THE MENU: To do this, locate the CONFIG:REF CAL menu entry and tap 2 to change the setting; flashes XREF IN or XREFOUT.
- If you DO NOT have a K3EXREF module installed, use the XREFOUT setting (the default). If you use the XREF IN setting without a K3EXREF module installed, you may hear digital switching noise on the 6-meter band.

MANUAL CORRECTIONS:

Pg. 5, 8, and 17: For K3 serial # 6588 or later, the accessory DC output is rated for a maximum current of 1.0 A (0.5 A prior to this). Earlier K3s can be updated using Elecraft p/n "K312MDKT" (K3 12-V modification kit).

See http://www.elecraft.com/K3/k3_software.htm for additional firmware release notes and update instructions.

ELECRAFT

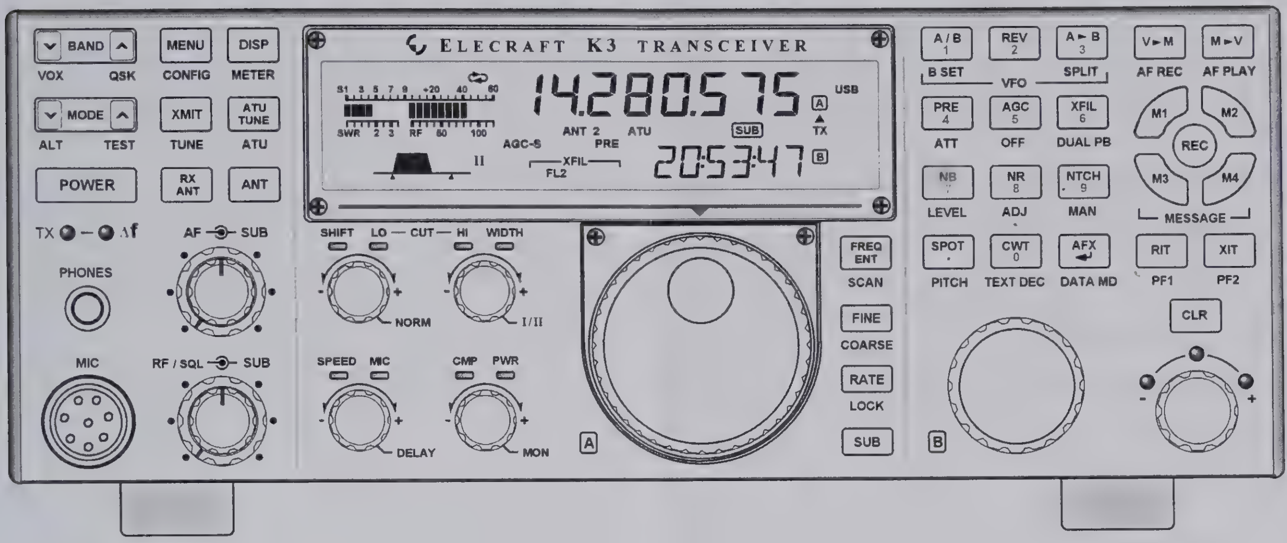
IMPORTANT

In order to attain the best performance from your K3, you should down load and install the Elecraft K3 Utility for your computer and operating system from our web site at

http://www.elecraft.com/K3/k3_software.htm#k3util/

Use it regularly to get the latest firmware from our web site and download it to your K3. This utility will also save and load K3 configurations, edit your filter settings, calibrate transmitter gain, and other useful functions.

If your computer has a serial port, use a serial cable from your PC with a male DB9 to plug into the K3's RS-232 port. If your computer only has USB ports, use a USB to Serial Cable (Elecraft KUSB) for this connection.



ELECRAFT® K3

HIGH-PERFORMANCE 160 – 6 METER TRANSCEIVER

KBPF3 GENERAL COVERAGE RECEIVE OPTION INSTALLATION INSTRUCTIONS

Rev D, June 24, 2008

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Contents

Introduction 3
  Customer Service and Support 3
    Technical Assistance 3
    Repair / Alignment Service 3
Preventing Electrostatic Discharge Damage 4
  How ESD Damage Occurs 4
  Preventing ESD Damage 4
Preparing for Installation 5
  Tools Required 5
  Parts Included 6
Installation Procedure 6
  Removing the Top Cover 6
  Removing the KRX3 Subreceiver Module 7
  Installing the KBPF3 in the KRX3 Subreceiver 8
    Installing KBPF3 Standoffs on KRX3 Board 9
    Installing the KBPF3 on the KRX3 Board 10
  Installing the KBPF3 in the K3 Main Receiver 11
    Installing the Standoffs on the K3 RF Board 11
    Installing the KBPF3 Board on the K3 RF Board 13
  Reassembly 14
  Enable the KBPF3 Module 15

Introduction

This manual covers the installation of the KBPF3 General Coverage Receive option in your K3 transceiver.

The KBPF3 provides the proper input filters to optimize receiver sensitivity outside of the Ham bands over the tuning range of 500 KHz to 30 MHz and from 48 MHz through 54 MHz. Either the main K3 receiver or the optional KRX3 subreceiver may be equipped with the KBPF3.

The KBPF3 consists of a single circuit board supported by two threaded standoffs. It plugs into the K3 RF board that covers the bottom of the K3 chassis enclosure, or the KRX3 Subreceiver board inside the shielded enclosure. Many K3s are already equipped with the necessary standoffs in both the KRX3 subreceiver and the main receiver. For those without the necessary standoffs pre-installed, a pair of standoffs and all the necessary hardware is included in this kit, along with full instructions for installing them.

In any case, only a few simple hand tools are needed and the installation does not involve any soldering. The tools required are listed on page 5.

Customer Service and Support

Technical Assistance

You can send e-mail to support@elecraft.com and we will respond quickly - typically the same day Monday through Friday. Telephone assistance is available from 9 A.M. to 5 P.M. Pacific time (weekdays only) at 831-662-8345. Please use e-mail rather than calling when possible since this gives us a written record of the details of your problem and allows us to handle a larger number of requests each day.

Repair / Alignment Service (We want to make sure everyone succeeds!)

If necessary, you may return your Elecraft product to us for repair or alignment. (Note: We offer unlimited email and phone support to get your kit running, so please try that route first as we can usually help you find the problem quickly.)

IMPORTANT: You must contact Elecraft before mailing your product to obtain authorization for the return, what address to ship it to and current information on repair fees and turn around times. (Frequently we can determine the cause of your problem and save you the trouble of shipping it back to us.) Our repair location is different from our factory location in Aptos. We will give you the address to ship your kit to at the time of repair authorization. *Packages shipped to Aptos without authorization will incur an additional shipping charge for reshipment from Aptos to our repair depot.*

Elecraft 1-Year Limited Warranty

This warranty is effective as of the date of first consumer purchase. It covers both our kits and fully assembled products. For kits, before requesting warranty service, you should fully complete the assembly, carefully following all instructions in the manual.

What is covered: During the first year after date of purchase (or if shipped from factory, date product is shipped to customer), Elecraft will replace defective or missing parts free of charge (post-paid). We will also correct any malfunction to kits or assembled units caused by defective parts and materials. Purchaser pays inbound shipping to us for warranty repair, we pay shipping to return the repaired equipment to you by UPS ground service or equivalent to the continental USA and Canada. Alaska, Hawaii and outside U.S. and Canada actual return shipping cost paid by owner.

What is not covered: This warranty does not cover correction of kit assembly errors. It also does not cover misalignment; repair of damage caused by misuse, negligence, or builder modifications; or any performance malfunctions involving non-Elecraft accessory equipment. The use of acid-core solder, water-soluble flux solder, or any corrosive or conductive flux or solvent will void this warranty in its entirety. Also not covered is reimbursement for loss of use, inconvenience, customer assembly or alignment time, or cost of unauthorized service.

Limitation of incidental or consequential damages: This warranty does not extend to non-Elecraft equipment or components used in conjunction with our products. *Any such repair or replacement is the responsibility of the customer. Elecraft will not be liable for any special, indirect, incidental or consequential damages, including but not limited to any loss of business or profits.*

Preventing Electrostatic Discharge Damage

There is no climate or work location where the components of your K3 are safe from Electrostatic Discharge (ESD) unless you take specific steps to prevent such damage. Many of the components in your K3 can be damaged by static discharges of only a few volts: far too little for you to notice. It is those low-voltage but destructive discharges that easily happen anywhere and under virtually any environmental conditions.

ESD damage may not be apparent at first. The damaged components may not fail completely. Instead, the damage may result in below-normal performance for an extended period of time before you experience a total failure.

How ESD Damage Occurs

Whenever an object containing a static charge touches a circuit in your K3, current will rush into the circuit until the components reach the same voltage as the source of the static charge. If the voltage or current that passes through a component during that brief period exceeds its normal operating specifications, it may be damaged or destroyed.

Preventing ESD Damage

ESD damage cannot occur if there is no voltage difference between the components in your K3 and any object that touches them. That is how anti-static packaging works. Anti-static bags allow the static charge to flow over their surface, so that any part of the bag that touches the components inside are all at the same potential at all times. Anti-static foam keeps the leads of sensitive components at the same potential.

At your work bench, avoiding a dangerous voltage is achieved most easily by tying everything together and connecting them to a common mains safety ground. This includes your K3, individual boards or other sensitive components as well as everything they may touch at the work table.

Inexpensive static dissipating work mats are readily-available that will steadily and safely drain off any charges built up on parts or circuit boards placed on them. They are supplied with a lead that connects the mat to the common workbench ground. Also, metal cabinets on test equipment used on the bench should be tied together and connected to the common ground.

Most importantly, you must have a way of continuously draining off any static charges that occur on your body. Such charges are easy to create, even while sitting quietly at the work bench. Moving your feet on the floor, shifting position in your chair or even moving your arms so that clothing rubs against itself can produce destructive static charges. You can discharge yourself by touching an unpainted metal ground, but that will last only until you move in a way that produces a new static charge. The safest technique is to wear a grounded wrist strap with a series 1-megohm resistor that continuously drains off any charges. Such wrist straps are readily-available and inexpensive.

⚠ ***WARNING***

> **DO NOT attach a ground directly to yourself without a current-limiting resistor as this poses a serious shock hazard. A wrist strap must include a 1-megohm resistor to limit the current flow. If you choose to touch an unpainted, metal ground to discharge yourself, do it only when you are not touching any live circuits with your other hand or any part of your body.**

We strongly recommend you take the following anti-static precautions (listed in order of importance) to avoid trouble:

- Leave ESD-sensitive parts in their anti-static packaging until you install them. The packaging may be a special plastic bag or the component's leads may be inserted in conductive foam. Parts which are especially ESD-sensitive are identified in the parts list and in the assembly procedures.
- Wear a conductive wrist strap with a series 1-megohm resistor. If you do not have a wrist strap, touch a ground briefly before touching any sensitive parts to discharge your body. Do this frequently while you are working. You can collect a destructive static charge on your body just sitting at the work bench. **DO NOT attach a ground directly to yourself as this poses a serious shock hazard.**
- Use a grounded anti-static mat on your work bench.
- If you choose to use a soldering iron to work on your K3 for any reason, be sure your iron has an ESD-safe grounded tip tied to the same common ground used by your mat or wrist strap.

Preparing for Installation

Tools Required

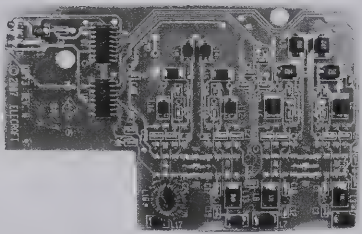
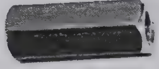
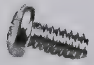
1. #0 and #1 size Phillips screwdrivers. To avoid damaging screws and nuts, a power screwdriver is ***not*** recommended. Use the screwdriver that best fits the screw in each step.
2. Small needle-nose pliers or tweezers to position small parts.
3. Soft cloth or clean, soft static dissipating pad to lay cabinet panels on to avoid scratching.

The following tools are strongly recommended:

1. ESD wrist strap.
2. Static dissipating work pad.

Parts Included

The following parts should be included in your kit. Check to ensure you have them all. If any parts are damaged or missing, contact Elecraft for replacements (see *Customer Service and Support*, page 3).

ILLUSTRATION	DESCRIPTION	QTY.	ELECRAFT PART NO.
	KBPF3 Printed Circuit Board ⚠ ***ESD Sensitive. Follow ESD safe handling procedures. Keep in ESD-safe bag until installed.***	1	E850269
	Standoff, 4-40, 1/2" (13 mm)	2	E700061
	Screw, 4-40, 1/4" (6.4 mm)	4	E700005
	Lock Washer, #4 split	6	E700004

Installation Procedure

> ⚠ **As you install components and reassemble your K3, be sure all the screws are in place and secure, but do not over tighten them. Failure to tighten all screws may result in poor shielding of sensitive components, resulting in possible noise or birdies in the receiver as well as other difficult-to-trace problems.**

Removing the Top Cover

☐ Disconnect power and all cables from your K3.

☐ Remove the nine screws to free the top cover as shown in Figure 1. After the cover is open, lift it gently to reach the speaker wire connector. Unplug the speaker then set the top cover aside in a safe place.

> ⚠ **Whenever you remove screws from a panel, if one screw seems too tight to loosen without damaging it, first loosen the other screws then try again. Sometimes one screw binds in its hole when the other screws are tightened.**

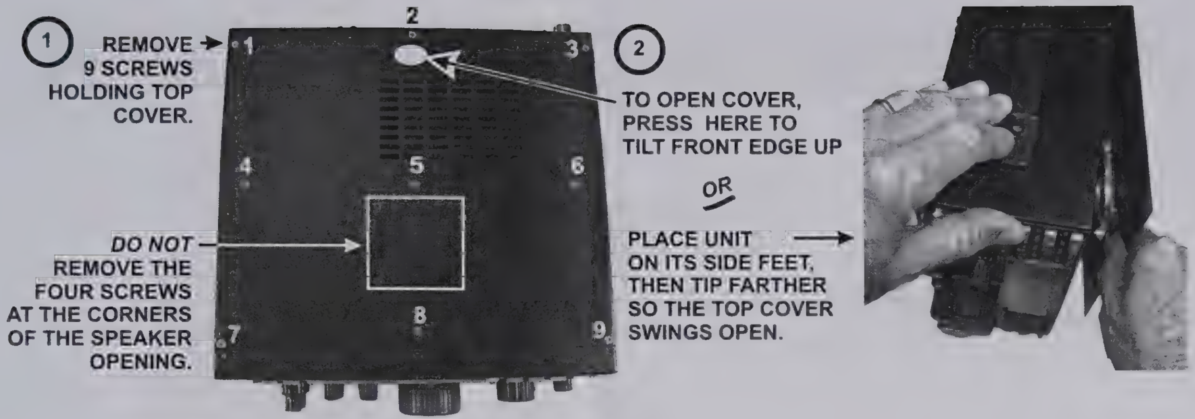

①
REMOVE 9 SCREWS HOLDING TOP COVER.
1
2
3
4
5
6
7
8
9
DO NOT REMOVE THE FOUR SCREWS AT THE CORNERS OF THE SPEAKER OPENING.
②
TO OPEN COVER, PRESS HERE TO TILT FRONT EDGE UP
OR
PLACE UNIT ON ITS SIDE FEET, THEN TIP FARTHER SO THE TOP COVER SWINGS OPEN.

Figure 1. Removing K3 Top Cover.

⚠ CAUTION: Touch an unpainted metal ground or wear a grounded wrist strap before touching components or circuit boards inside the K3. See *Preventing ESD Damage* on page 4 for more information.

Removing the KRX3 Subreceiver Module

If your K3 is equipped with the optional KRX3 Subreceiver, you must remove the subreceiver module to install the KBPF3 in either the main receiver or the subreceiver. The KRX3 subreceiver module is the "L" shaped metal enclosure (see Figure 2). Remove the subreceiver module as follows:

☐ Remove the chassis stiffener bar that runs across the top of the K3 chassis and is attached to the side panels. If the KPA3 is installed, the stiffener will be attached to the KPA3 shield by two screws. These screws may have nuts and lock washers or they may thread into permanently-attached PEM nuts on the stiffener bar.

☐ Remove the two 1-1/2" (38 mm) screws and lock washers shown in Figure 2. These screws extend all the way through the KRX3 module and secure it to standoffs mounted on the main RF board that fills the bottom of the K3.

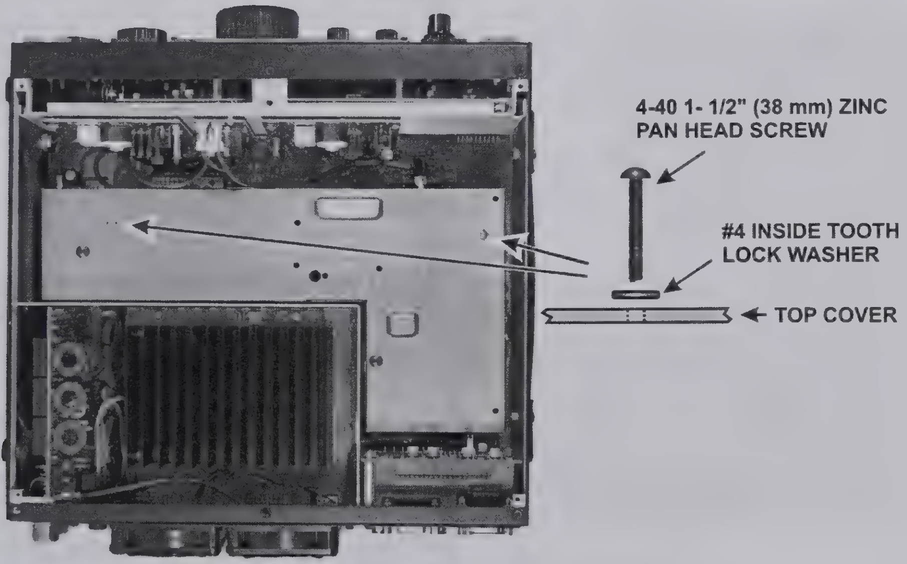

4-40 1- 1/2" (38 mm) ZINC PAN HEAD SCREW
#4 INSIDE TOOTH LOCK WASHER
TOP COVER

Figure 2. Removing the KRX3 Module.

⚠ **In the following steps you will handle small TMP coaxial connectors. These are friction-fit connectors shown in Figure 3. Handle the connectors by the grips as shown.** ***Do not pull on the coaxial cable.***

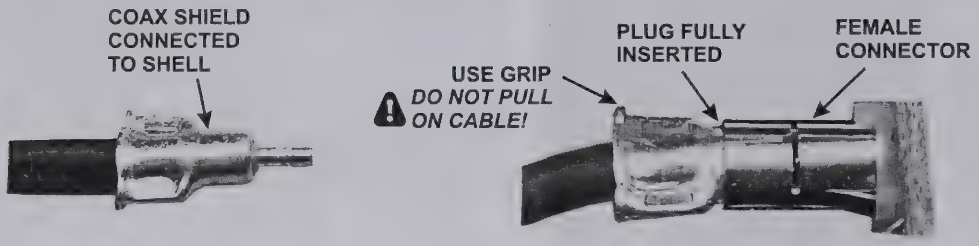


Figure 3. TMP Coaxial Connectors.

☐ Hold the KRX3 module by the two brass knurled nuts on the top, and lift it straight up to gain access to the small TMP coaxial connectors plugged into the module. There are two along the front. There may be one at the back as well, depending upon the options installed. As you lift the KRX3 module, it will unplug from two small interface circuit boards. One is at the front and the other is at the rear. These small boards may come out with the module or they may remain attached to the K3 main RF board.

☐ Unplug the TMP coaxial cables leading to the KRX3 module, then lift the module free and set it aside.

☐ Locate the two small interface circuit boards that fit between the connectors on the KRX3 module and the connectors on the K3 RF board. Remove them and put them in a safe place.

Installing the KBPF3 in the KRX3 Subreceiver

If you are ***not*** installing a KPBF3 in the subreceiver, go directly to *Installing the KBPF3 in the K3 Main Receiver* on page 11.

☐ Unscrew the two knurled nuts shown in Figure 4 and lift the top half of the enclosure off. There are two unthreaded sleeves over the long screws above the circuit board that will slide off easily (see Figure 5). Be sure you don't lose them.

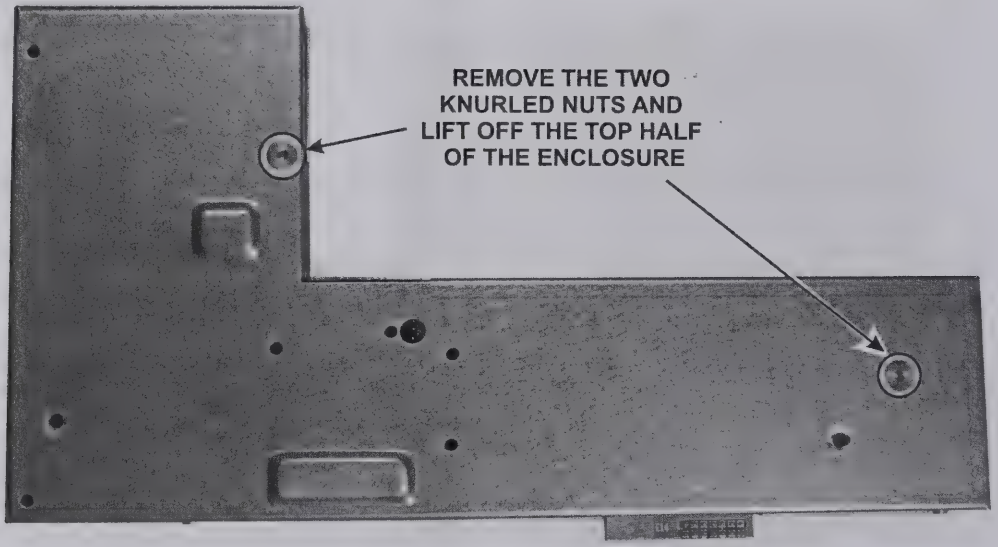

REMOVE THE TWO KNURLED NUTS AND LIFT OFF THE TOP HALF OF THE ENCLOSURE

Figure 4. Removing the Top of the KRX3 Enclosure.

☐ Check to see if the KBPF3 standoffs are already mounted at the locations shown in Figure 5. if so, go directly to *Installing the KBPF3 on the KRX3 Board* on page 10 Otherwise continue with *Installing KBPF3 Standoffs on KRX3 Board* below.

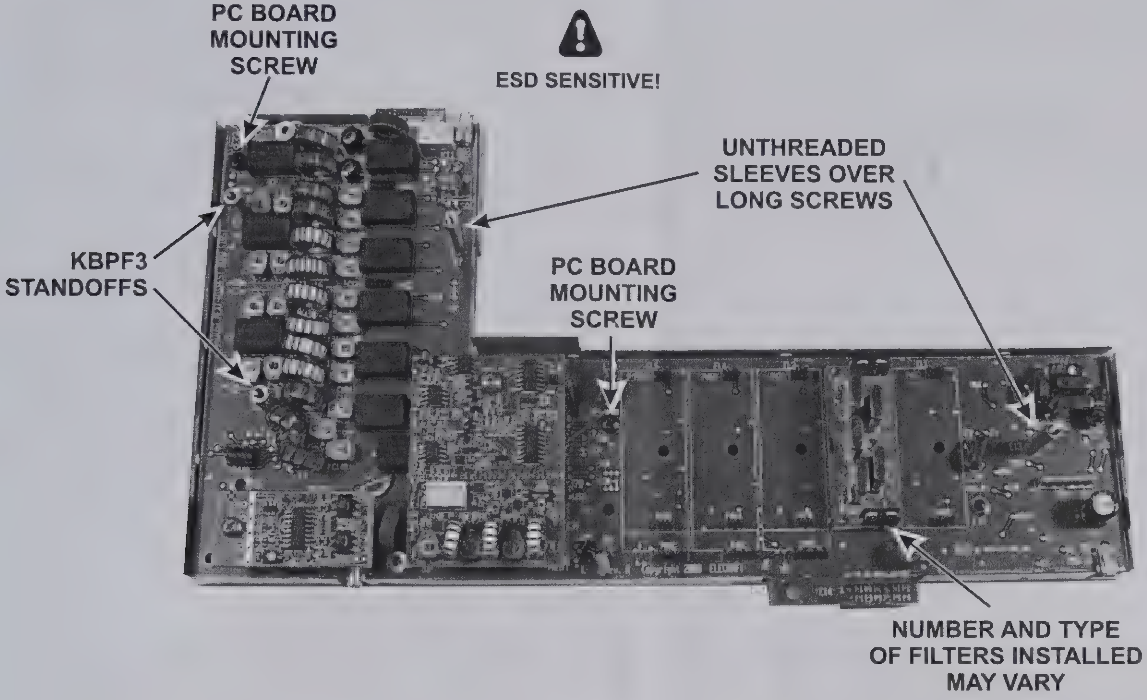

PC BOARD MOUNTING SCREW
ESD SENSITIVE!
UNTHREADED SLEEVES OVER LONG SCREWS
KBPF3 STANDOFFS
PC BOARD MOUNTING SCREW
NUMBER AND TYPE OF FILTERS INSTALLED MAY VARY

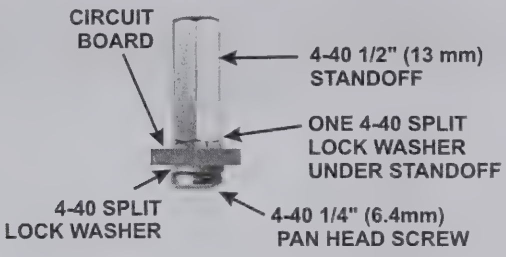
Figure 5. KRX3 PC Board

Installing KBPF3 Standoffs on KRX3 Board

☐ Remove the two unthreaded sleeves over the long screws shown in Figure 5, then remove the two PC board mounting screws. Each screw has a split lock washer under it.

☐ Lift the KRX3 pc board with the two pony boards and filters attached out of the bottom half of the enclosure. The board fits snugly in the bottom of the enclosure with small bumps along the edges of the board resting in small holes along the sides of the enclosure. Lift the board straight up and off of the long screws.

☐ Install the 1/2" (13 mm) standoffs at locations E1 and E3 on the KRX3 pc board (see Figure 5). Use the hardware exactly as shown in Figure 6. The lock washer between the standoff and the pc board is very important to establish the correct height above the board.


CIRCUIT BOARD
4-40 1/2" (13 mm) STANDOFF
ONE 4-40 SPLIT LOCK WASHER UNDER STANDOFF
4-40 SPLIT LOCK WASHER
4-40 1/4" (6.4mm) PAN HEAD SCREW

THE KRX3 BOARD ASSEMBLY IS ESD SENSITIVE!

Figure 6. Installing KPBF3 Standoffs.

☐ Place the KRX3 main circuit board in the bottom shield so that the 1-1/2" screws extend through holes E7 and E13 on the KRX3 board. Press the KRX3 main circuit board down against the standoffs. The board will "snap" into position as the small bumps along the edges of the board slip into the holes in the sides of the shield. When properly positioned, the board will be against the standoffs in the bottom of the enclosure under holes E1 and E10 (the label for E10 may be partially covered by a jumper wire on the board).

☐ Secure the KRX3 main circuit board to the standoffs at E1 and E10 with 4-40 3/16" (4.8 mm) black pan head screws and #4 split lock washers you removed earlier (see Figure 7).

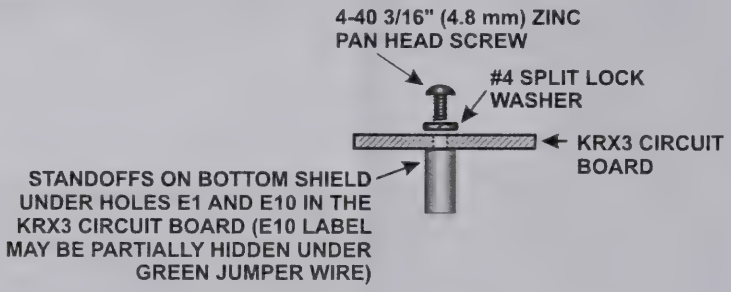

4-40 3/16" (4.8 mm) ZINC PAN HEAD SCREW
#4 SPLIT LOCK WASHER
KRX3 CIRCUIT BOARD
STANDOFFS ON BOTTOM SHIELD UNDER HOLES E1 AND E10 IN THE KRX3 CIRCUIT BOARD (E10 LABEL MAY BE PARTIALLY HIDDEN UNDER GREEN JUMPER WIRE)

Figure 7. Mounting KRX3 Main PC Board on Bottom Shield.

Installing the KBPF3 on the KRX3 Board

☐ Install the KBPF3, making sure the three connectors on the bottom of the board mate with P44A, P44C and P44E on the KRX3 board. The screw holes will line up with the standoffs when the board is positioned correctly (see Figure 5). Secure the KBPF3 board two 4-40 1/4" (6.4 mm) pan head screws and #4 split lock washers as shown.

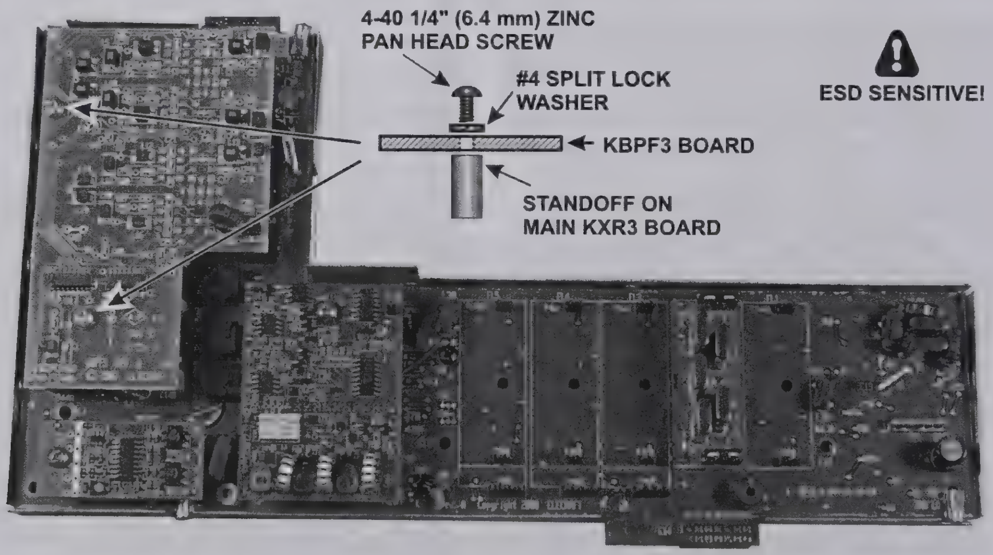

4-40 1/4" (6.4 mm) ZINC PAN HEAD SCREW
#4 SPLIT LOCK WASHER
KBPF3 BOARD
STANDOFF ON MAIN KXR3 BOARD
ESD SENSITIVE!

Figure 8. Mounting KPBF3 on the KRX3 Board.

☐ If you removed them, place the 7/8" (22 mm) unthreaded sleeves over the long screws so they rest against the top of the circuit board (see Figure 5).

☐ Place the top shield over the assembly and adjust its position so the edge of the top fits inside the bottom and rests against the KRX3 main board on all sides. The long screws will pass through holes in the top cover.

☐ Secure the top with the knurled nuts, tightened only enough to hold the cover in place so it isn't loose.

If you are installing another KBPF3 in the main K3 receiver, go to *Installing the KBPF3 in the K3 Main Receiver* below. Otherwise, go to *Reassembly* on page 14 to finish the installation.

Installing the KBPF3 in the K3 Main Receiver

Installing the Standoffs on the K3 RF Board

Check the RF board that covers the bottom of the chassis area to see if the standoffs shown in Figure 9 are installed. (Note that the stiffening bar across the top of the K3 chassis has been removed to show the standoffs more clearly.) Do the following steps only if the standoffs are not already installed as shown. If the standoffs are already in place, go directly to *Installing the KBPF3* on page 13.

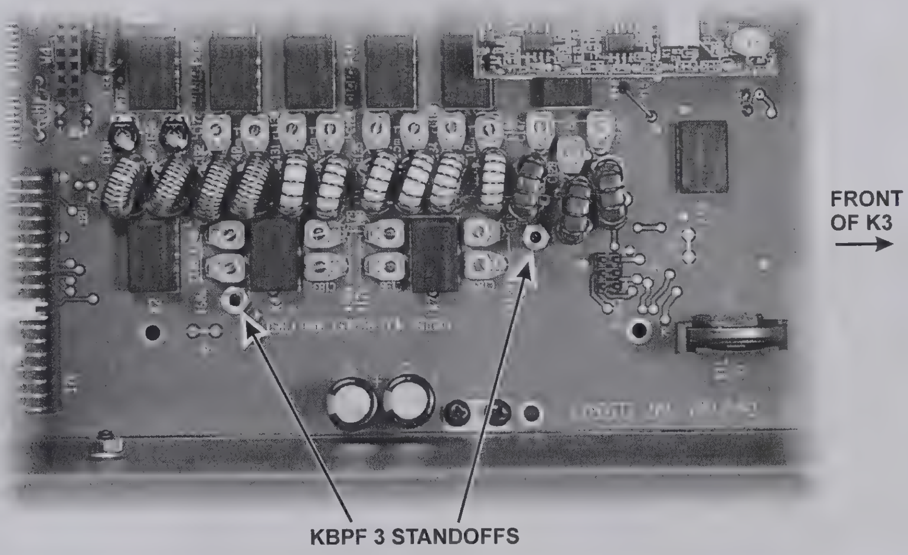
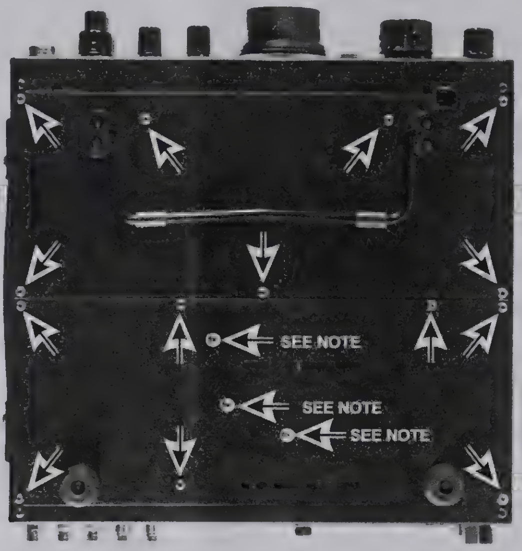


Figure 9. KBPF3 Standoff Locations.

☐ Remove both bottom covers from the K3 by removing the screws shown in Figure 10.

ESD SENSITIVE!

WEAR A GROUNDED WRIST STRAP OR TOUCH AN UNPAINTED METAL GROUND BEFORE HANDLING THE RF BOARD.

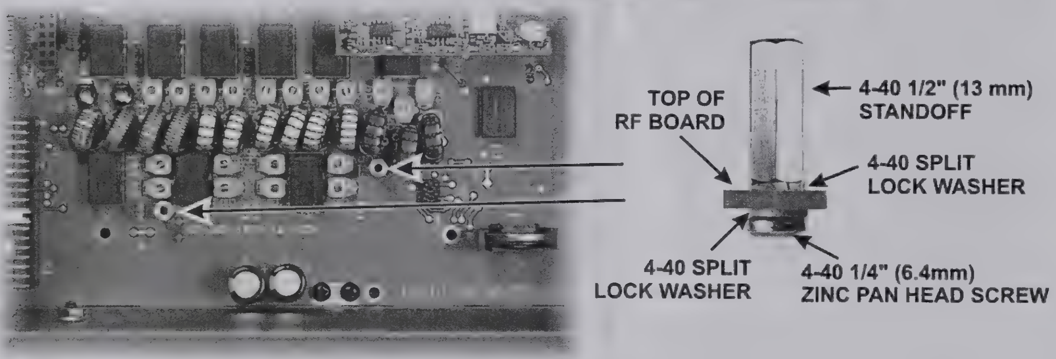


REMOVE ALL THE SCREWS INDICATED AND LIFT THE BOTTOM COVERS OFF.

NOTE:
THESE THREE SCREWS ARE 1/4" (6.4 mm) LONG AND HAVE INSIDE TOOTH LOCK WASHERS UNDER THE SCREW HEADS.
ALL THE OTHER SCREWS ARE 3/16" (4.8 mm) LONG AND HAVE NO LOCK WASHERS.

Figure 10. Removing K3 Bottom Cover.

☐ Install two 1/2” (13 mm) standoffs on the RF board as shown Figure 11.Use the hardware exactly as shown. The lock washer between the standoff and the pc board is very important to establish the correct height above the board.


TOP OF RF BOARD
4-40 1/2" (13 mm) STANDOFF
4-40 SPLIT LOCK WASHER
4-40 SPLIT LOCK WASHER
4-40 1/4" (6.4mm) ZINC PAN HEAD SCREW

ESD SENSITIVE!

Figure 11. Installing KBFP3 Standoffs.

☐ Replace both bottom covers using the 4-40 black pan head screws you removed earlier. Note that three locations take the 4-40 1/4” (6.4 mm) black pan head screws with lock washers as shown in Figure 10 while the remainder are 4-40 3/16” (4.8 mm) screws . Be sure these are in the correct locations!

CAUTION!

Failure to replace the three 1/4” (6.4 mm) bottom screws with their lock washers in the locations shown in Figure 10 may destroy power transistors in your K3!

Installing the KBPF3 Board on the K3 RF Board

There are three connectors on the bottom of the KBPF3 board that must be properly mated to P44A, P44C and P44E on the RF board (see Figure 12). Even though the connectors may be hard to see as they are mated, especially if the KPA3 shield is installed, they can be aligned as follows:

☐ Set the KBPF3 board in place over the standoffs, aligning it so the holes in the KBPF3 board are aligned with the screw holes in the tops of the standoffs. This will align the connectors.

☐ Press down on the KBPF3 board to mate the while checking to ensure that the holes in the board are aligned with the holes in the standoffs. ***Note that simply installing the mounting screws will not ensure the 3-pin connectors are fully mated.*** When properly mounted the KBPF3 board should rest on top of the standoffs and be parallel with the RF board underneath.

☐ Attach the KBPF3 board with a 4-40 1/4" (6.4 mm) zinc pan head screw and lock washer at each standoff as shown in Figure 12.

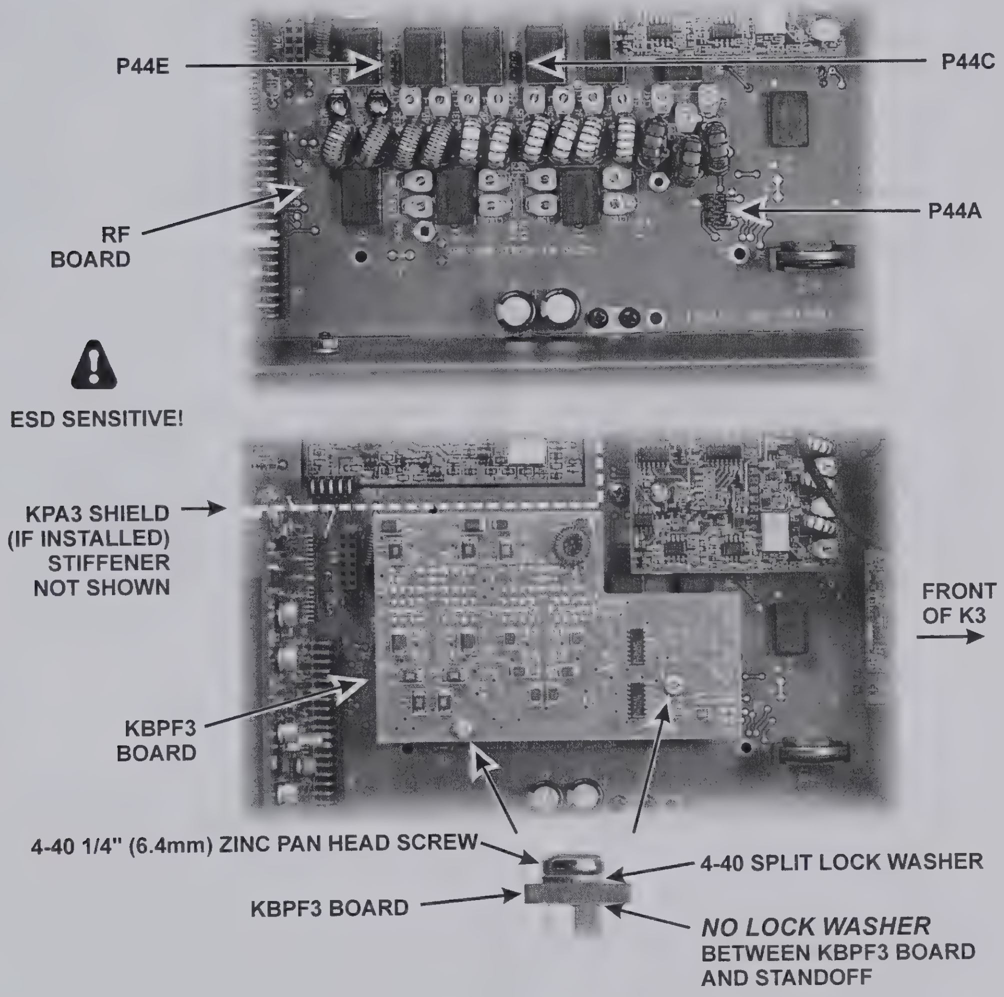

P44E
P44C
RF BOARD
P44A
ESD SENSITIVE!
KPA3 SHIELD (IF INSTALLED) STIFFENER NOT SHOWN
FRONT OF K3
KBPF3 BOARD
4-40 1/4" (6.4mm) ZINC PAN HEAD SCREW
4-40 SPLIT LOCK WASHER
KBPF3 BOARD
NO LOCK WASHER BETWEEN KBPF3 BOARD AND STANDOFF

Figure 12. Mounting the KPBF3 Board.

Reassembly

☐ If your K3 is equipped with the KRX3 Subreceiver, turn to your *KRX3 Subreceiver Installation and Operation* manual, *Installing the KRX3 Subreceiver Module* section to replace the KRX3 module. Be especially careful to do the following as described in that procedure:

- Be sure the cover on battery BT1 on the K3 RF board is in place. The cover is essential to avoid shorting the battery. The outer rim of the battery is the positive terminal, and may come in contact with the grounded bottom of the KRX3 enclosure if the cover is not in place.
- Be sure all the TMP cables are properly connected or your K3 will not operate properly.
- Be sure the TMP cable to J85 on the subreceiver module is routed as shown to prevent signal leakage between the KRX3 and the K3 main receiver.

⚠ REPLACE ALL THE SCREWS!

The K3's chassis has excellent rigidity despite its light weight. The screws that hold the top cover in place are an important part of the structural design. Be sure to replace all the screws and verify they are tight whenever you replace the cover or other panels

☐ If you removed it, replace the chassis stiffener bar as shown in Figure 13. Some stiffener bars do not have permanently-attached PEM nuts for the screws attaching them to the KPA3 shield. If not, you found 4-40 nuts when the bar was removed. Place the lock washers under the nuts instead of under the screw heads.

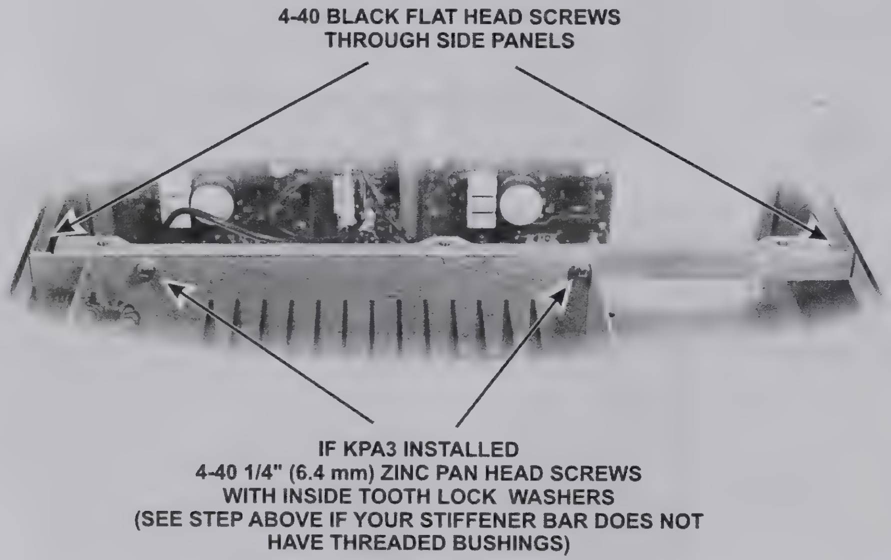

4-40 BLACK FLAT HEAD SCREWS
THROUGH SIDE PANELS
IF KPA3 INSTALLED
4-40 1/4" (6.4 mm) ZINC PAN HEAD SCREWS
WITH INSIDE TOOTH LOCK WASHERS
(SEE STEP ABOVE IF YOUR STIFFENER BAR DOES NOT
HAVE THREADED BUSHINGS)

Figure 13. Installing the Chassis Stiffener (Viewed from Rear of K3).

☐ Hold the top cover above the K3, route the speaker wire under the stiffener bar and plug it into P25 on the KIO3 board at the left rear of the K3 as shown in Figure 14.

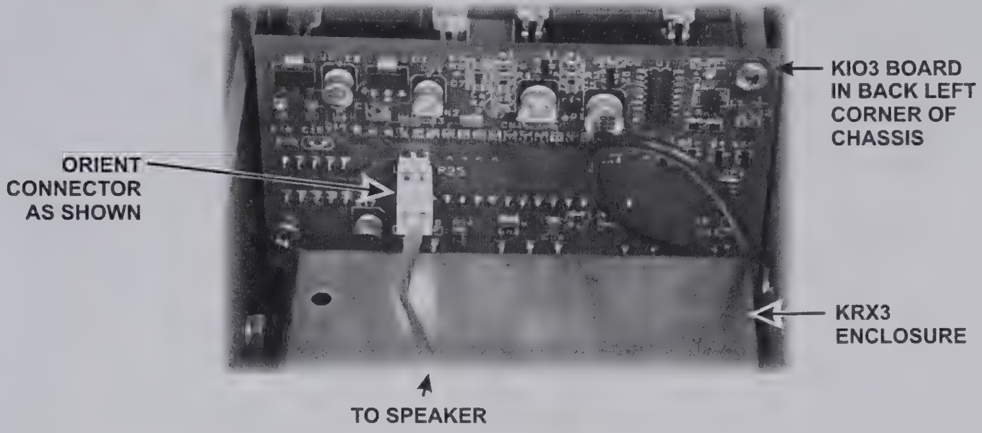

ORIENT CONNECTOR AS SHOWN
KIO3 BOARD IN BACK LEFT CORNER OF CHASSIS
KRX3 ENCLOSURE
TO SPEAKER
P25

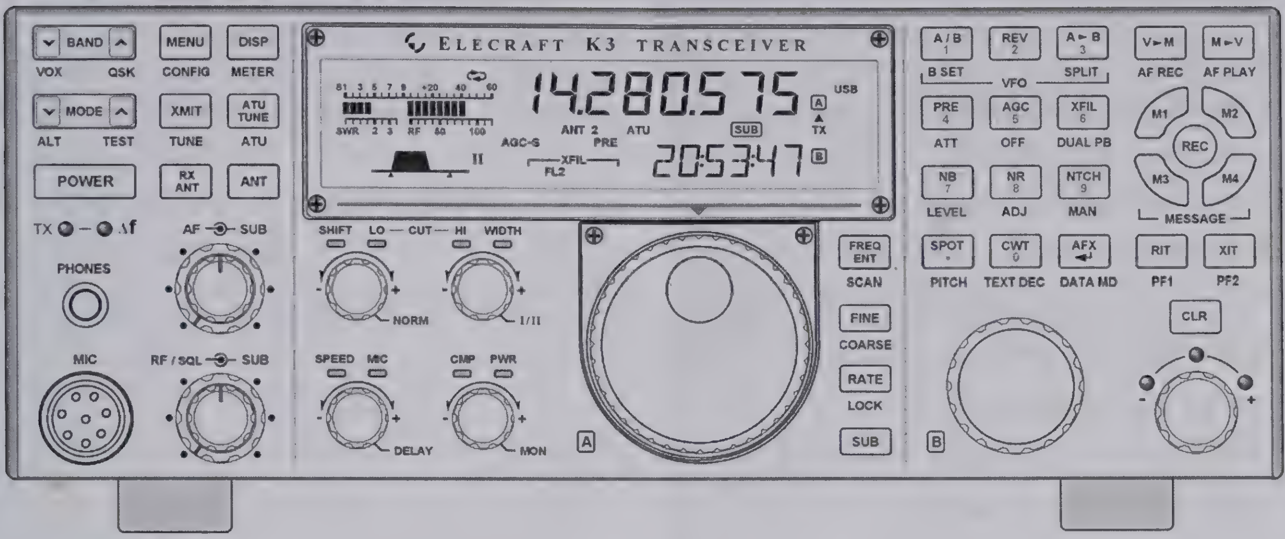
Figure 14. Connecting Speaker Cable.

☐ Position the top cover on the K3. Note that the tab on the back center goes under the rear lip of the K3 rear panel. Secure the top cover with the nine 4-40 3/16" (4.8 mm) black flat head screws you removed earlier.

Enable the KBPF3 Module

☐ Enable the KBPF3 for either the main or subreceiver using the **CONFIG** menu as described in the Owner's Manual. ***The KBPF3 will not operate until this is done!***

This completes the installation of the KBPF3 module(s) in your K3 transceiver.



ELECRAFT® K3

HIGH-PERFORMANCE 160 – 6 METER
TRANSCEIVER

KPA3 100-WATT AMPLIFIER OPTION
INSTALLATION INSTRUCTIONS

Rev G, July 25, 2011
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Contents

Introduction 3
  Customer Service and Support 3
    Technical Assistance 3
    Repair / Alignment Service 3
Preventing Electrostatic Discharge Damage 4
  How ESD Damage Occurs 4
  Preventing ESD Damage 4
Preparing for Installation 5
  Tools Required 5
  Parts Included 6
Installation Procedure 7
  Removing the KRX3 Subreceiver Module 9
  Removing the KNB3 Module 10
  Installing the KPA3 Shield 11
  Installing the KPAIO3 Interface Module 12
  Assembling the Fan Panel 14
  Installing the KPA3 Amplifier Module 16
  Installing the Fan Panel 16
  Replacing the KNB3 Module 18
  Replacing the KRX3 Module 18
  Replacing the Covers 19
  Configuring and Calibrating the KPA3 20
Circuit Description 21
  KPAIO3 21
  KPA3 Fan Panel 21
  KPA3 Power Amplifier 21

Introduction

This manual covers the installation of the KPA3 100-watt amplifier option in your K3 transceiver. Only a few basic hand tools are needed (see page 5) to perform the installation. No soldering or wiring is required.

The KPA3 option consists of three subassemblies: the KPA3 power amplifier, a fan panel, and the KPAIO3 interface module. More details about the KPA3 are provided under *Circuit Description* on page 21.

Customer Service and Support

Technical Assistance

You can send e-mail to support@elecraft.com and we will respond quickly - typically the same day Monday through Friday. Telephone assistance is available from 9 A.M. to 5 P.M. Pacific time (weekdays only) at 831-763-4211. Please use e-mail rather than calling when possible since this gives us a written record of the details of your problem and allows us to handle a larger number of requests each day.

Repair / Alignment Service *(We want to make sure everyone succeeds!)*

If necessary, you may return your Elecraft product to us for repair or alignment. (Note: We offer unlimited email and phone support to get your kit running, so please try that route first as we can usually help you find the problem quickly.)

IMPORTANT: You must contact Elecraft before mailing your product to obtain authorization for the return, what address to ship it to and current information on repair fees and turn around times. (Frequently we can determine the cause of your problem and save you the trouble of shipping it back to us.) Our repair location is different from our factory location in Aptos. We will give you the address to ship your kit to at the time of repair authorization. *Packages shipped to Aptos without authorization will incur an additional shipping charge for reshipment from Aptos to our repair depot.*

Elecraft's 1-Year Limited Warranty

This warranty is effective as of the date of first consumer purchase (or if shipped from factory, date product is shipped to customer). It covers both our kits and fully assembled products. For kits, before requesting warranty service, you should fully complete the assembly, carefully following all instructions in the manual.

Who is covered: This warranty covers the original owner of the Elecraft product as disclosed to Elecraft at the time of order. Elecraft products transferred by the purchaser to a third party, either by sale, gift or other method, who is not disclosed to Elecraft at the time of original order, are not covered by this warranty. If the Elecraft product is being bought indirectly for a third party, the third party's name and address must be provided to Elecraft at time of order to insure warranty coverage.

What is covered: During the first year after date of purchase, Elecraft will replace defective or missing parts free of charge (post-paid). We will also correct any malfunction to kits or assembled units caused by defective parts and materials. Purchaser pays inbound shipping to Elecraft for warranty repair, Elecraft will pay shipping to return the repaired equipment to you by UPS ground service or equivalent to the continental USA and Canada. Alaska, Hawaii and outside U.S. and Canada actual return shipping cost paid by owner.

What is not covered: This warranty does not cover correction of kit assembly errors. It also does not cover misalignment; repair of damage caused by misuse, negligence, or builder modifications; or any performance malfunctions involving non-Elecraft accessory equipment. The use of acid-core solder, water-soluble flux solder, or any corrosive or conductive flux or solvent will void this warranty in its entirety. Also not covered is reimbursement for loss of use, inconvenience, customer assembly or alignment time, or cost of unauthorized service.

Limitation of incidental or consequential damages: This warranty does not extend to non-Elecraft equipment or components used in conjunction with our products. Any such repair or replacement is the responsibility of the customer. Elecraft will not be liable for any special, indirect, incidental or consequential damages, including but not limited to any loss of business or profits.

Preventing Electrostatic Discharge Damage

There is no climate or work location where the components of your K3 are safe from Electrostatic Discharge (ESD) unless you take specific steps to prevent such damage. Many of the components in your K3 can be damaged by static discharges of only a few volts: far too little for you to notice. Those low-voltage but destructive discharges easily happen anywhere and in almost any environment.

ESD damage may not be apparent at first. The damaged components may not fail completely. Instead, the damage may result in below-normal performance for an extended period of time before you experience a total failure.

How ESD Damage Occurs

Whenever an object containing a static charge touches a circuit in your K3, current will rush into the circuit until the components reach the same voltage as the source of the static charge. If the voltage or current that passes through a component during that brief period exceeds its normal operating specifications, it may be damaged or destroyed.

Preventing ESD Damage

ESD damage cannot occur if there is no voltage difference between the components in your K3 and any object that touches them. That is how anti-static packaging works. Anti-static bags allow the static charge to flow over their surface, so that any part of the bag that touches the components inside are all at the same potential at all times. Anti-static foam keeps the leads of sensitive components at the same potential.

At your work bench, avoiding a dangerous voltage is achieved most easily by tying everything together and connecting them to a common mains safety ground. This includes your K3, individual boards or other sensitive components as well as everything they may touch at the work table.

Inexpensive static dissipating work mats are readily-available that will steadily and safely drain off any charges built up on parts or circuit boards placed on them. They are supplied with a lead that connects the mat to the common workbench ground. Also, metal cabinets on test equipment used on the bench should be tied together and connected to the common ground.

Most importantly, you must have a way of continuously draining off any static charges that occur on your body. Such charges are easy to create, even while sitting quietly at the work bench. Moving your feet on the floor, shifting position in your chair or even moving your arms so that clothing rubs against itself can produce destructive static charges. You can discharge yourself by touching an unpainted metal ground, but that will last only until you move in a way that produces a new static charge. The safest technique is to wear a grounded wrist strap with a series 1-megohm resistor that continuously drains off any charges. Such wrist straps are readily-available and inexpensive.

⚠ ***WARNING***

DO NOT attach a ground directly to yourself without a current-limiting resistor as this poses a serious shock hazard. A wrist strap must include a 1-megohm resistor to limit the current flow. If you choose to touch an unpainted, metal ground to discharge yourself, do it only when you are not touching any live circuits with your other hand or any part of your body.

We strongly recommend you take the following anti-static precautions (listed in order of importance) to avoid trouble:

- Leave ESD-sensitive parts in their anti-static packaging until you install them. The packaging may be a special plastic bag or the component's leads may be inserted in conductive foam. Parts which are especially ESD-sensitive are identified in the parts list and in the assembly procedures.
- Wear a conductive wrist strap with a series 1-megohm resistor. If you do not have a wrist strap, touch a ground briefly before touching any sensitive parts to discharge your body. Do this frequently while you are working. You can collect a destructive static charge on your body just sitting at the work bench. **DO NOT attach a ground directly to yourself as this poses a serious shock hazard.**
- Use a grounded anti-static mat on your work bench.
- If you choose to use a soldering iron to work on your K3 for any reason, be sure your iron has an ESD-safe grounded tip tied to the same common ground used by your mat or wrist strap.

Preparing for Installation

Tools Required

1. #0 and #1 size Phillips screwdrivers. To avoid damaging screws and nuts, a power screwdriver is ***not*** recommended. Use the screwdriver that best fits the screw in each step.
2. Small diagonal cutters.
3. Needle-nose pliers.
4. Soft cloth or clean, soft static dissipating pad to lay cabinet panels on to avoid scratching.

The following tools are strongly recommended:

1. ESD wrist strap.
2. Static dissipating work pad.

Parts Included

The following parts should be included in your kit. Check to ensure you have them all. If any parts are damaged or missing, contact Elecraft for replacements (see *Customer Service and Support*, page 3).

⚠ CAUTION

In addition to taking ESD precautions, be careful not to damage components on either side of the circuit boards when handling them. This is especially true of the KPA3 module because of the weight of the heat sink.

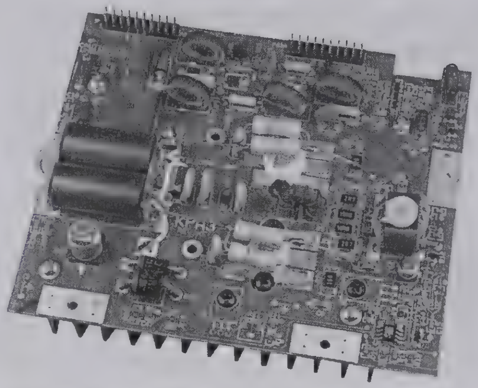
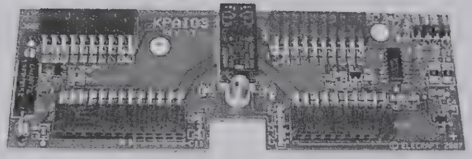
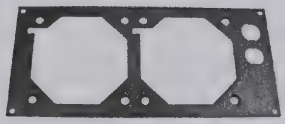
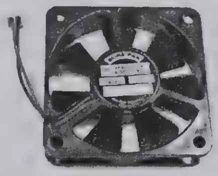
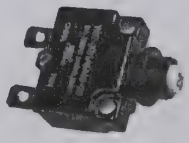
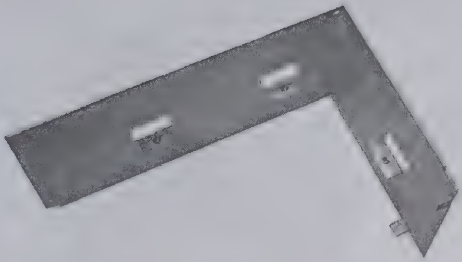
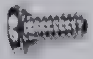
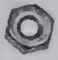
ILLUSTRATION	DESCRIPTION	QTY.	ELECRAFT PART NO.
	KPA3 Module ⚠ ***ESD Sensitive.***	1	E850273
	KPAIO3 Interface Module ⚠ ***ESD Sensitive***	1	E850271
	Fan Panel	1	E100288
	Fan with short lead	1	E850293
	Fan with long lead	1	E850294
	Finger Guard	2	E980143
	Circuit Breaker, 20A	1	E980128

ILLUSTRATION	DESCRIPTION	QTY.	ELECRAFT PART NO.
	Rear Shield	1	E100217
	Screw, 4-40, 1/4" (6.4 mm) Zinc, Pan Head	9	E700005
	Screw, 4-40, 1/4" (6.4 mm) Black, Pan Head	1	E700009
	Screw, 4-40, 3/8" (9.5 mm) Black, Flat Head	1	E700131
	Screw, 4-40, 7/8" (22 mm) Black, Flat Head	8	E700159
	Acorn Nut, 4-40	8	E700160
	Standoff, 4-40, 5/16" (7.9 mm) long	1	E700121
	Lock Washer, #4 Inside Tooth	4	E700010
	Lock Washer, #4 Split	4	E700004
	Nut, 4-40	1	E700011

Installation Procedure

⚠ **K3 KIT BUILDERS: If you were directed here to install the KPA3 module as part of the initial K3 assembly, begin here to complete the installation. Skip over the steps indicated.**

☐ Disconnect power and all cables from your K3.

☐ Remove the nine screws to free the top cover as shown in Figure 1. After the cover is open, lift it gently to reach the speaker wire connector. Unplug the speaker and set the top cover aside in a safe place.

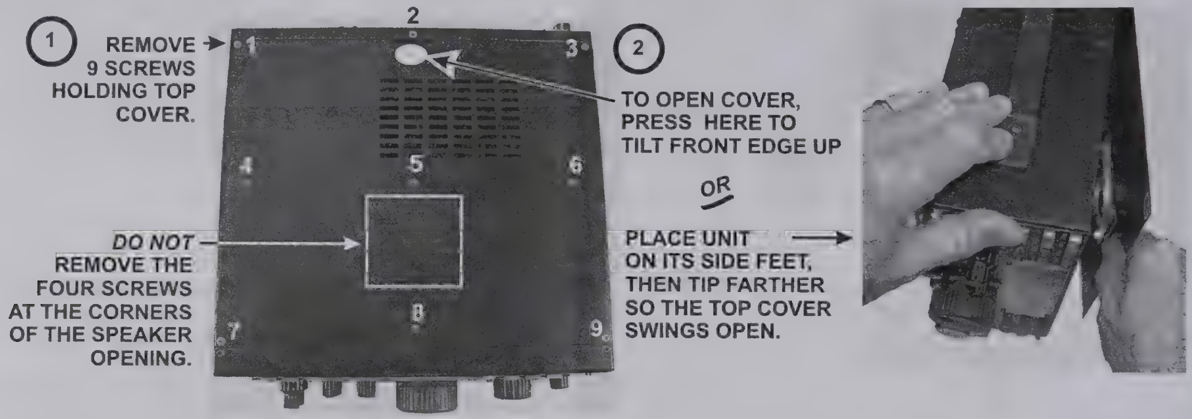

①
REMOVE 9 SCREWS HOLDING TOP COVER.
1
2
3
4
5
6
7
8
9
DO NOT REMOVE THE FOUR SCREWS AT THE CORNERS OF THE SPEAKER OPENING.
②
TO OPEN COVER, PRESS HERE TO TILT FRONT EDGE UP
OR
PLACE UNIT ON ITS SIDE FEET, THEN TIP FARTHER SO THE TOP COVER SWINGS OPEN.

Figure 1. Removing K3 Top Cover.

⚠ CAUTION: Touch an unpainted metal ground or wear a grounded wrist strap before touching components or circuit boards inside the K3. See *Preventing ESD Damage* on page 4 for more information.

☐ On the rear of the K3, remove the large blank panel above the GND screw. This panel will not be used again, but the screws will be needed to mount the KPA3 cooling fans. (If you are installing the KPA3 as part of building your K3 kit, this panel may not be installed.). Newer panels have a hole marked ANT3 for the antenna connection to the optional K144XV 2-meter module. If you do not have the K144XV option, a plastic plug will fill this hole. Remove the plug or the antenna connector. To prevent accidental short circuits, either tape the metal end of the BNC connector or unplug the cable from the K144XV module and remove it entirely for now.

☐ Turn the K3 upside down and remove the bottom cover(s) as shown in Figure 2. Note that, if you are finishing the KPA3 installation after assembling your K3 kit, only the rear portion of the bottom cover need be removed.

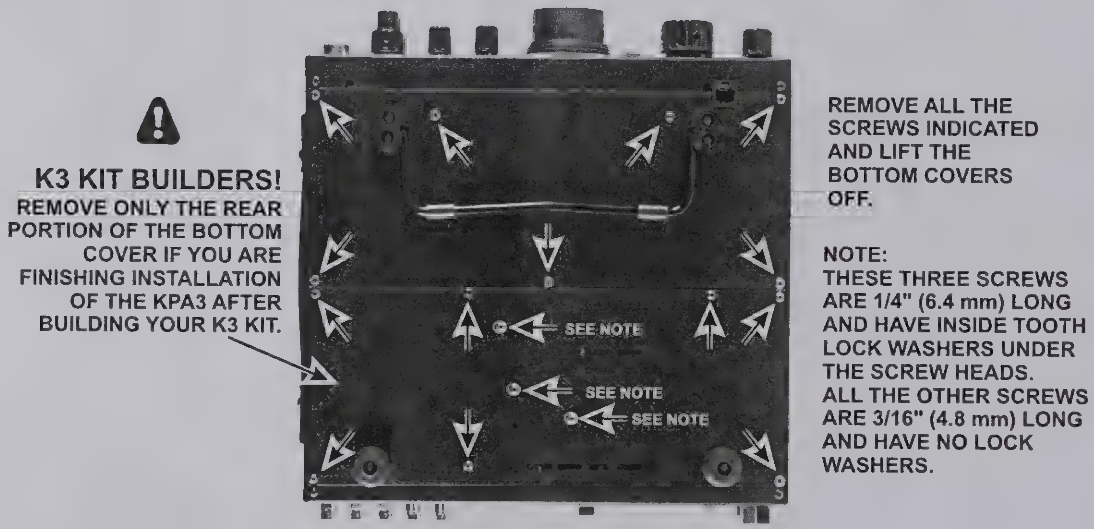

K3 KIT BUILDERS!
REMOVE ONLY THE REAR PORTION OF THE BOTTOM COVER IF YOU ARE FINISHING INSTALLATION OF THE KPA3 AFTER BUILDING YOUR K3 KIT.
SEE NOTE
SEE NOTE
SEE NOTE
REMOVE ALL THE SCREWS INDICATED AND LIFT THE BOTTOM COVERS OFF.
NOTE:
THESE THREE SCREWS ARE 1/4" (6.4 mm) LONG AND HAVE INSIDE TOOTH LOCK WASHERS UNDER THE SCREW HEADS.
ALL THE OTHER SCREWS ARE 3/16" (4.8 mm) LONG AND HAVE NO LOCK WASHERS.

Figure 2. Removing the K3 Bottom Covers.

⚠ **K3 KIT BUILDERS: If you are installing the KPA3 as part of the initial K3 kit assembly, skip the following steps and resume with *Installing the KPAIO3 Interface Module* on page 12**

☐ Remove the stiffener bar that runs from side to side across the top of the K3 chassis. This is the bar the center three screws in the top cover thread into. The bar is held in place by a single screw at each side.

Removing the KRX3 Subreceiver Module

If your K3 is equipped with the optional KRX3 Subreceiver, you must remove the subreceiver module to install the KPA3 shield. The KRX3 subreceiver module is the "L" shaped metal enclosure shown in Figure 3. The K3 in the figure has a fully-installed KPA3 showing how it fits next to the KRX3 module.

Remove the subreceiver module as follows:

☐ Remove the chassis stiffener bar that runs across the top of the K3 chassis and is attached to the side panels.

☐ Remove the two 1-1/2" (38 mm) screws and lock washers shown in Figure 3. These screws extend all the way through the KRX3 module and secure it to standoffs mounted on the main RF board that fills the bottom of the K3.

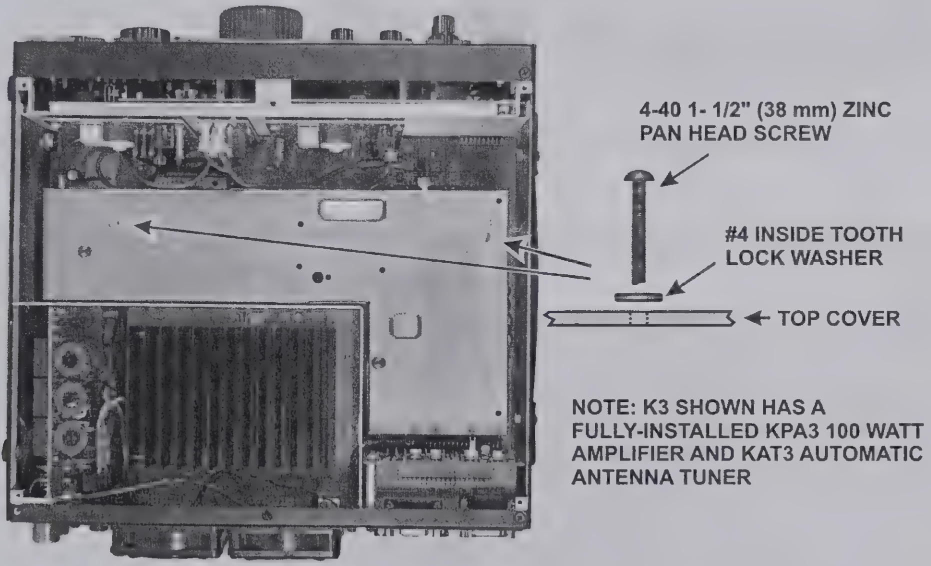

4-40 1- 1/2" (38 mm) ZINC PAN HEAD SCREW
#4 INSIDE TOOTH LOCK WASHER
TOP COVER
NOTE: K3 SHOWN HAS A FULLY-INSTALLED KPA3 100 WATT AMPLIFIER AND KAT3 AUTOMATIC ANTENNA TUNER

Figure 3. Removing the KRX3 Module.

⚠ **In the following steps you will handle small TMP coaxial connectors. These are friction-fit connectors shown in Figure 4. Handle the connectors by the grips as shown. *Do not pull on the coaxial cable.***

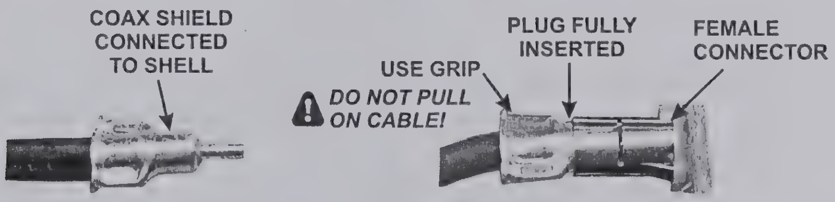


Figure 4. TMP Coaxial Connectors.

☐ Hold the KRX3 module by the two brass knurled nuts on the top, and lift it straight up to gain access to the small TMP coaxial connectors plugged into the module. There are two along the front. There may be one at the back as well, depending upon the options installed. As you lift the KRX3 module, it will unplug from two small interface circuit boards. One is at the front and the other is at the rear. These small boards may come out with the module or they may remain attached to the K3 main RF board.

☐ Unplug the TMP coaxial cables leading to the KRX3 module, then lift the module free and set it aside.

☐ Locate the two small interface circuit boards that fit between the connectors on the KRX3 module and the connectors on the K3 RF board. Remove them and put them in a safe place.

☐ Unplug and remove the loose TMP cables that were connected to the KRX3 module. If your K3 is equipped with a cable connected to a BNC connector at the rear panel AUX RF input, this cable will not unplug. It is permanently attached to the BNC connector Wrap the metal TMP connector in insulating tape to ensure it cannot short to any circuits inside the K3.

> ⚠ ***CAUTION:*** **You will apply power to make tests before reinstalling the KRX3 module again. If the loose cables are not removed or insulated to prevent shorts as described in the previous step, you may destroy circuits in your K3 when you apply power.**

Removing the KNB3 Module

KNB3 module must be removed to provide clearance needed to install the KPA3 shield in the following section.

☐ Remove the KNB3 module, the standoff, screw and washers from the RF board (see Figure 5). They will be reinstalled later.

> ⚠ ***CAUTION:*** **The KNB3 module is ESD sensitive. Put it in a safe place until you reinstall it.**

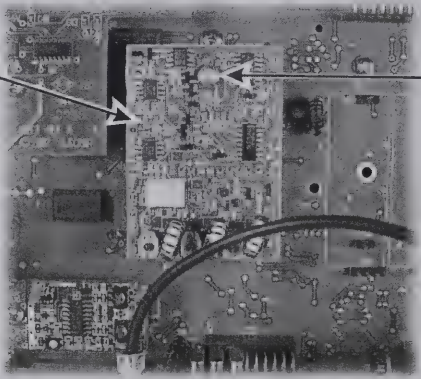
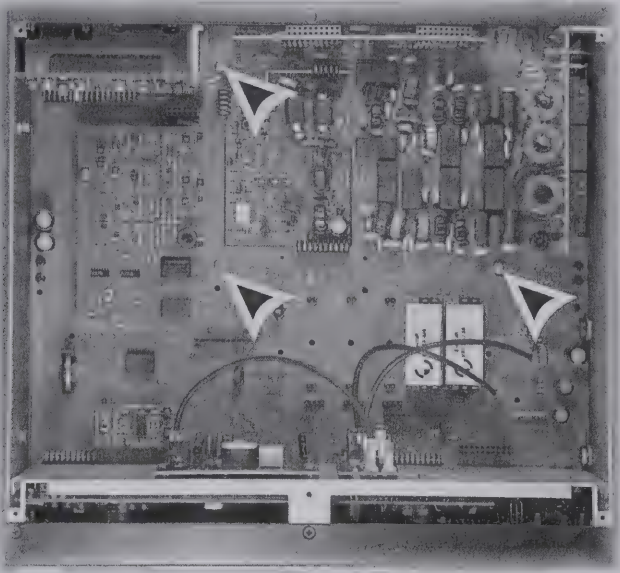

KNB3 MODULE
ESD SENSITIVE!
REMOVE THIS SCREW AND LIFT THE KNB3 MODULE OUT OF THE K3.
REMOVE THE STANDOFF, SCREW AND WASHERS. THEY WILL BE REINSTALLED LATER.

Figure 5. Removing the KNB3 Module.

Installing the KPA3 Shield

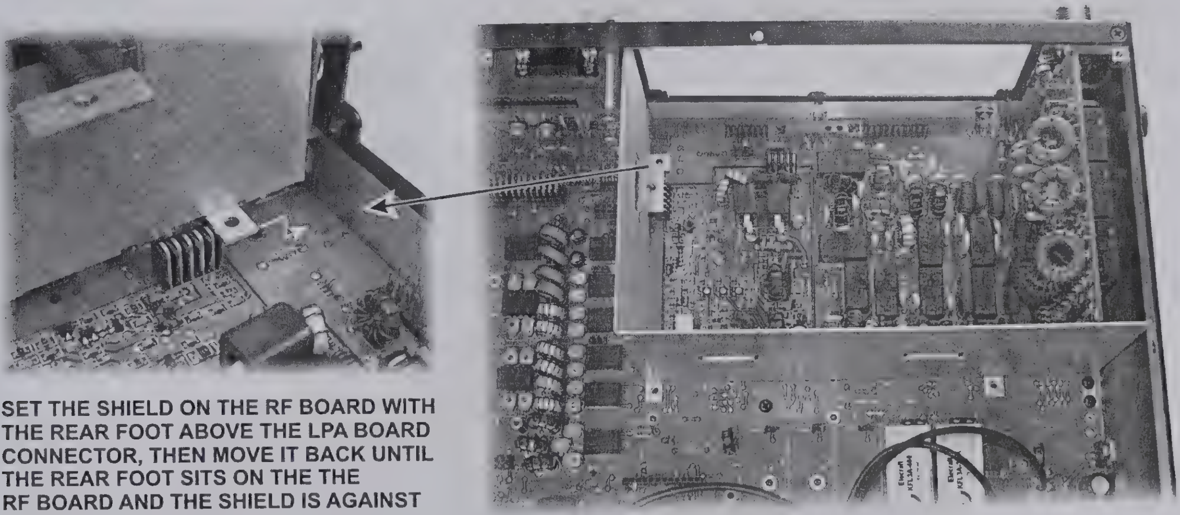
☐ Remove the three screws, washers and standoffs (on the bottom of the RF) board shown in Figure 6. Save the lock washers and standoffs. The screws will not be reused.



REMOVE THE SCREWS WASHERS AND (ON THE BOTTOM OF THE RF BOARD) THE STANDOFFS.

Figure 6. Rear Shield Mounting Screw Locations.

☐ Set the rear shield in place as shown in Figure 7.



SET THE SHIELD ON THE RF BOARD WITH THE REAR FOOT ABOVE THE LPA BOARD CONNECTOR, THEN MOVE IT BACK UNTIL THE REAR FOOT SITS ON THE THE RF BOARD AND THE SHIELD IS AGAINST THE REAR PANEL.

Figure 7. Positioning the Rear Shield.

☐ Loosely secure the rear shield with three 1/4” (6.4 mm) zinc pan head screws, the lock washers and standoffs you removed earlier as shown in Figure 8.

☐ Place a black 4-40 3/8” (9.5 mm) flat head screw through the hole in the back panel and the tab at the top edge of the shield as shown in Figure 8. Secure it with a #4 inside tooth lock washer and 4-40 nut.

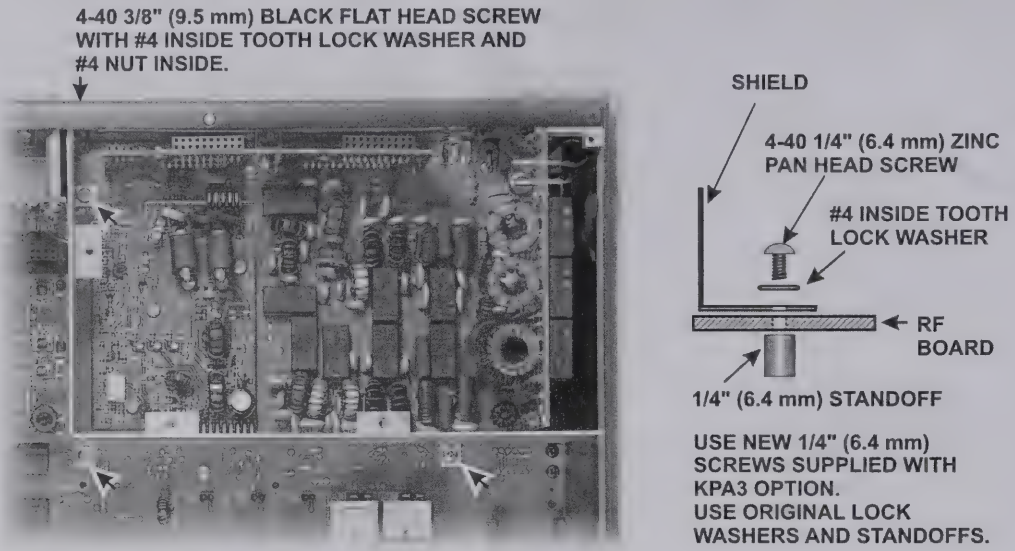

4-40 3/8" (9.5 mm) BLACK FLAT HEAD SCREW WITH #4 INSIDE TOOTH LOCK WASHER AND #4 NUT INSIDE.
SHIELD
4-40 1/4" (6.4 mm) ZINC PAN HEAD SCREW
#4 INSIDE TOOTH LOCK WASHER
RF BOARD
1/4" (6.4 mm) STANDOFF
USE NEW 1/4" (6.4 mm) SCREWS SUPPLIED WITH KPA3 OPTION.
USE ORIGINAL LOCK WASHERS AND STANDOFFS.

Figure 8. Rear Shield Installed.

☐ Tighten the three screws holding the bottom of the shield and the screw at the top on the back panel. Do not over-tighten but ***be sure all four screws are tight. Don’t overlook one! Good contact is essential for the shield to perform correctly.***

Installing the KPAIO3 Interface Module

⚠ **K3 KIT BUILDERS: Resume the installation with the following step.**

☐ Locate PA Jumper block mounted on RF board connectors P67A and P67B just inside the opening for the fans. Unplug the Jumper Block. Put the Jumper Block in a safe place. You’ll need it if you want to operate the K3 without the KPA3 module installed.

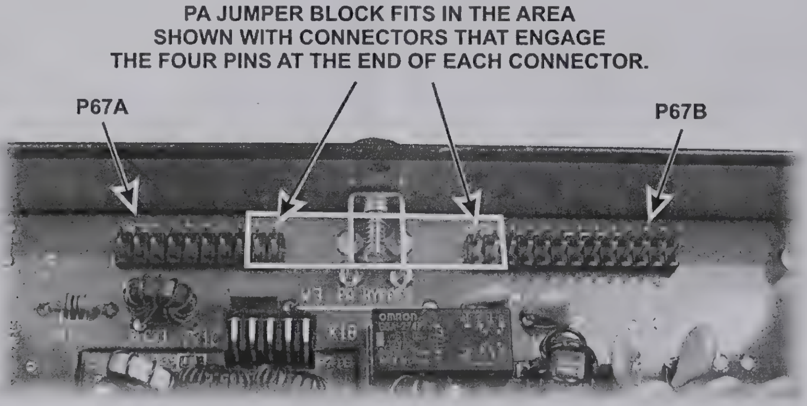

PA JUMPER BLOCK FITS IN THE AREA SHOWN WITH CONNECTORS THAT ENGAGE THE FOUR PINS AT THE END OF EACH CONNECTOR.
P67A
P67B

Figure 9. Removing PA Jumper Block.

☐ On the KPAI03 board, install a 5/16" (7.9 mm) 4-40 standoff near K1 as shown in Figure 10. Use the exact hardware shown. This is important so that the height of the standoff is correct when it is mounted in the K3.

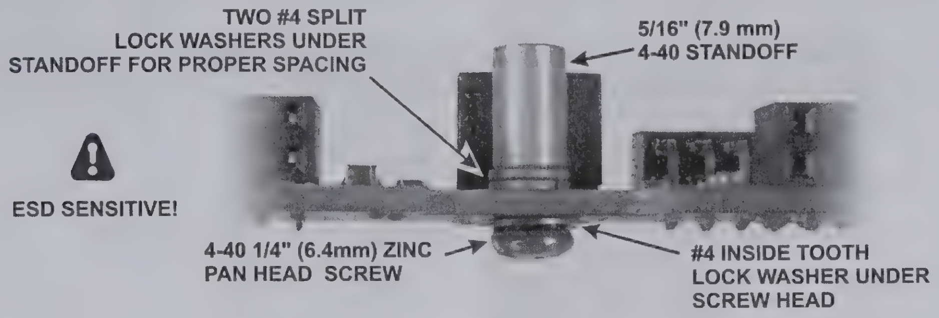


Figure 10. Installing Standoff on the KPAIO3 Board.

As you install components and reassemble your K3, be sure all the screws are in place and secure, but do not over tighten them. Failure to tighten all screws may result in poor shielding of sensitive components, resulting in possible noise or birdies in the receiver as well as other difficult-to-trace problems.

☐ If you are adding the KPA3 after assembling your K3 from a kit, remove the rear section of the bottom cover (see Figure 2 on page 8) in order to properly support the RF board in the following step.

☐ Install the KPAIO3 board just inside the opening in the rear panel as shown in Figure 11. Connector J67A on the KPAIO3 mates with P67A on the RF board, and J67B on the KPAIO3 mates with P67B on the RF board. These connectors may fit very tightly. **Press one side then the other as needed to fully mate the connectors while supporting the RF board from below with your fingers.** When the connectors are fully mated, the standoff on the KPAIO3 will line up with the hole in the back panel. Secure the KPAIO3 with a 4-40 1/4" (6.4 mm) black pan head screw. Do not use a washer.

ESD SENSITIVE!

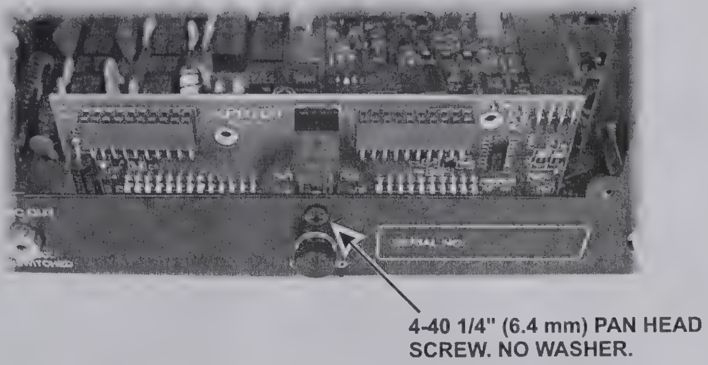


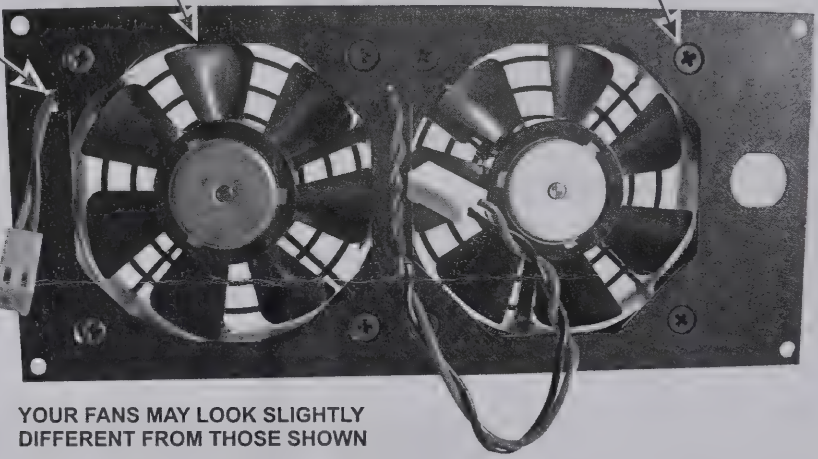
Figure 11. Installing the KPAIO3 Module.

Assembling the Fan Panel

☐ Locate the fan panel and mount the fans as shown in Figures 12 and 13 using 4-40 7/8" black flat head screws and acorn nuts. Note that the appearance of the fans in your kit may differ slightly from those shown.

> **If you purchased the optional Stainless Steel screw kit, use the 4-40, 7/8" black flat had screws and acorn nuts from the kit to mount the fans on the panel as described below. Include a stainless steel interior tooth lock washer from the kit under each acorn nut.**

1. Orient the fans with the side with the manufacturer's label facing away from the panel.
2. The fans have leads with different lengths. Position them on the panel as shown.
3. As you tighten the acorn nuts, adjust the position of each finger guard so it is straight and aligned with the fan opening.



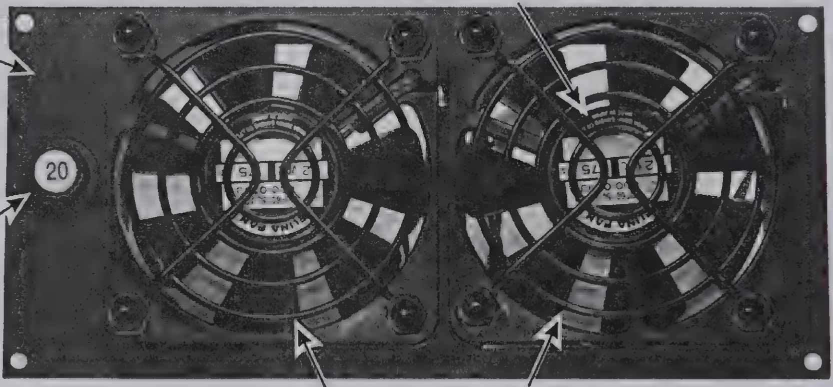
FAN WITH SHORTEST LEADS MUST GO ON THIS END

ORIENT PANEL SO SCREWS TO FIT IN BEVELED HOLES AND LIE FLUSH WITH THE PANEL

ROUTE LEADS THROUGH SLOT IN PANEL

YOUR FANS MAY LOOK SLIGHTLY DIFFERENT FROM THOSE SHOWN

Figure 12. Fan Panel Inside View.



ORIENT FANS WITH MANUFACTURER'S LABEL ON THIS SIDE

CURRENT PANELS HAVE A HOLE MARKED ANT3 IN THIS AREA

ORIENT CIRCUIT BREAKER AS SHOWN

ADJUST THE POSITIONS OF THE FINGER GUARDS AS YOU TIGHTEN THE ACORN NUTS SO THEY ARE STRAIGHT AND CENTERED

Figure 13, Completed Fan Panel from Rear.

☐ Install the 20A circuit breaker in the small hole with the pushbutton on the same side as the fans as shown in Figure 13.

☐ Position the fan panel near the rear opening and plug the fan leads into the connectors in the upper right corner of the KPAIO3 board as shown in Figure 14. Be sure to orient the connectors so the red lead is to the left as indicated on the board. If the connectors don't want to slide onto the pins, check to see if there is any extra plastic on the side facing the board. If so, trim it smooth with a hobby knife or your diagonal cutters.

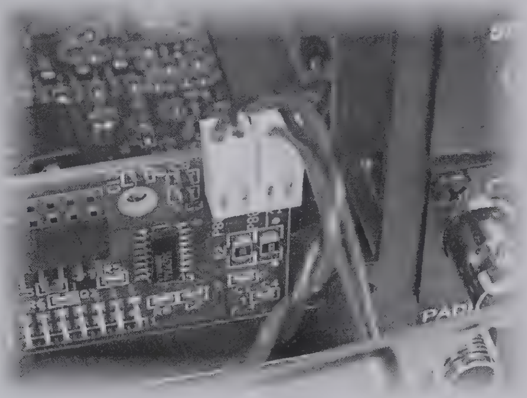


Figure 14. Connecting Fans to the KPAIO3 Board.

⚠ ***CAUTION:*** **If you removed a KRX3 subreceiver module, be sure the loose TMP cables have been removed or the metal TMP connectors are fully insulated with electrical tape before proceeding. Otherwise accidental shorts may destroy circuits in your K3.**

☐ Connect a power supply to your K3 and test the fans and KPAIO3 interface control as follows:

_ Press the POWER button to turn the K3 on.

_ Hold **CONFIG** to select the Configuration menu, then turn VFO B to KPA3. Normally, the display will indicate NOT INST (not installed).

_ Turn the VFO A knob to PAIO ON, then turn it further to PAIO TST. When moving between ON and TST, you should hear a relay click on the KPAIO3 board. If you don't, press the K3 POWER button to switch it off, then on again and retry the test.

_ Turn the VFO A knob on past TST to FN1, then FN2, FN3 and FN4. The fans should start turning at FN1 and increase speed as you continue to FN4.

_ Turn the K3 off and disconnect the power supply.

☐ Unplug the fans and set them aside for now.

Installing the KPA3 Amplifier Module

⚠ Your KPA3 module may produce a rattling sound when shaken. This is normal. It is caused by ferrite beads sliding along wire leads in the module.

☐ Place the KPA3 module inside the shield from the top. Mate the two connectors fully with the KPAIO3 board as shown in Figure 15. Like the KPAIO3 to RF board connectors, these connectors may require some force to mate them fully. Do not place undue pressure on the RF board without supporting it. Recommend you place your fingers on the bottom of the RF board, under the connectors to the KPAIO3 board, and squeeze down with your thumbs on the KPA3 board above the connectors until they are fully mated.

⚠

ESD SENSITIVE!

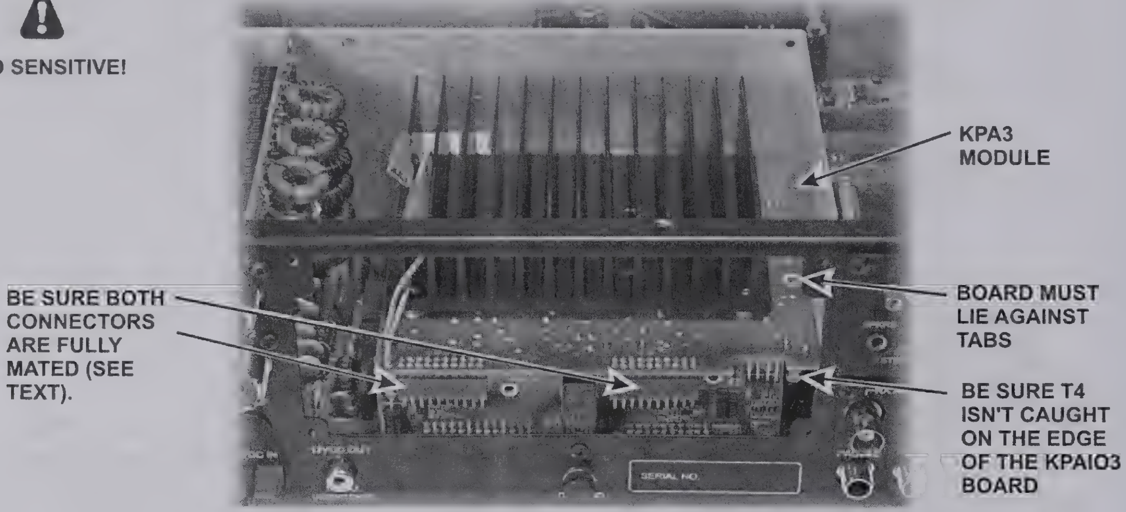

KPA3 MODULE
BE SURE BOTH CONNECTORS ARE FULLY MATED (SEE TEXT).
BOARD MUST LIE AGAINST TABS
BE SURE T4 ISN'T CAUGHT ON THE EDGE OF THE KPAIO3 BOARD
SERIAL NO.

Figure 15. Mounting the KPA3 Module.

☐ Secure the KPA3 module to the rear shield tabs with three 4-40, 1/4" (6.4mm) zinc pan head screws. Place a #4 inside tooth lock washer under each screw head.

Installing the Fan Panel

☐ Current KPA3 fan panels have a hole near the circuit breaker marked ANT3 for the antenna connection to the optional K144XV 2-meter module:

- If you are adding the KPA3 to a K3 that has the K144XV option installed, install the connector and cable you removed from the blank panel earlier in the ANT3 hole in the fan panel. Route the antenna cable along the top of the KPA3 pc board across the opening for the fans and through the opening in the shield near the KIO3 board.
- If you do not have the K144XV option, a plastic plug is provided to fill this hole. Use the plug you removed from the hole marked ANT3 in t he existing blank panel if you are updating a built K3. If you are installing the KPA3 while building your K3 kit, the plug will be in the K3 Miscellaneous Bag.

☐ Position the fan panel you assembled earlier behind the opening at the rear of the K3 and connect the leads as shown in Figure 16.

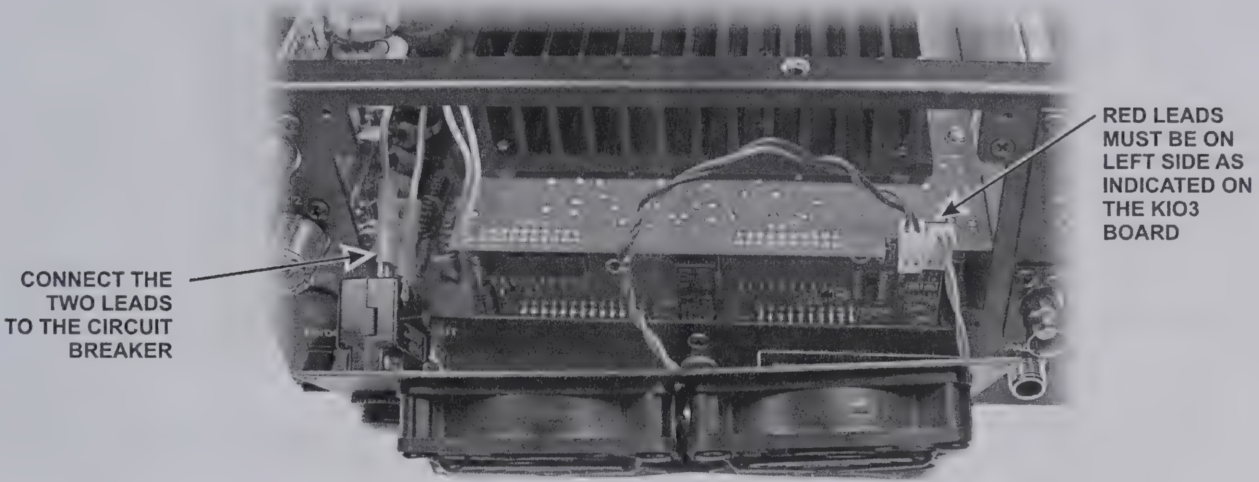

RED LEADS MUST BE ON LEFT SIDE AS INDICATED ON THE KIO3 BOARD
CONNECT THE TWO LEADS TO THE CIRCUIT BREAKER

Figure 16. Connecting Fan Panel to K3.

☐ Mount the fan panel on the K3 using four 3/16” (4.8 mm) black pan head screws as shown in Figure 17. These are the screws you that originally held the blank panel. If you haven’t installed the blank panel, the screws are included with basic K3 parts. Do not use washers.

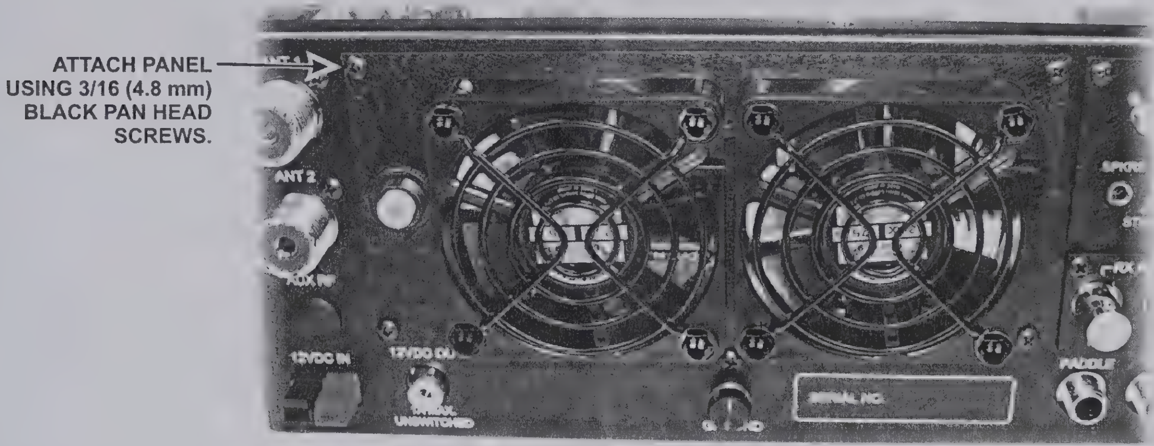


Figure 17. Fan Panel Installed on K3.

☐ Dress the fan leads so they are well clear of the fan blades. Check to ensure both fans turn freely.

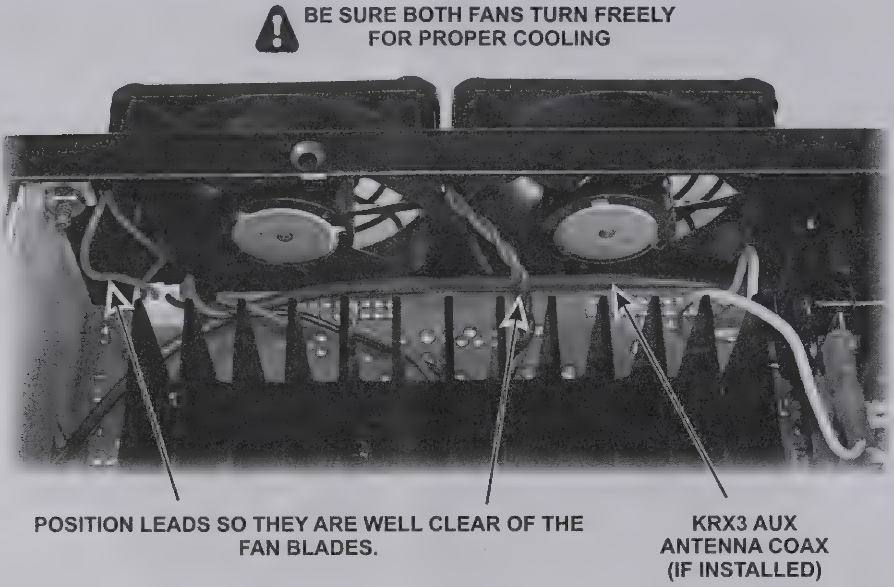

BE SURE BOTH FANS TURN FREELY FOR PROPER COOLING
POSITION LEADS SO THEY ARE WELL CLEAR OF THE FAN BLADES.
KRX3 AUX ANTENNA COAX (IF INSTALLED)

Figure 18. Positioning the Fan Leads.

⚠ **K3 KIT BUILDERS: Skip the following steps. Resume with *Replacing the Covers* on page 19**

Replacing the KNB3 Module

☐ Replace the standoff and the KNB3 module you removed earlier (see Figure 5). When mounting the standoff on the RF board, be sure to place one lock washer under the screw head on the bottom of the board, and two lock washers between the standoff and the top of the board. A fourth lock washer goes under the screw holding the KNB3 module itself.

Replacing the KRX3 Module

If your K3 is not equipped with the KRX3 Subreceiver, go directly to *Replacing the Covers* below to continue.

☐ If your KRX3 installation uses the Auxiliary Antenna input to the KRX3, a coaxial cable will be present that runs from the KAT3 or from a connector on the rear panel AUX RF connector. Refer to your *KRX3 Subreceiver Installation and Operation* manual, *Auxiliary KRX3 Antenna Input (Optional)* section for instructions on how to route this cable across the KPA3 enclosure to reach the KRX3 module.

☐ Turn to your *KRX3 Subreceiver Installation and Operation* manual, *Installing the KRX3 Subreceiver Module* section to replace the KRX3 module. Be especially careful to do the following as described in that procedure:

- Be sure the cover on battery BT1 on the K3 RF board is in place. The cover is essential to avoid shorting the battery. The outer rim of the battery is the positive terminal, and may come in contact with the grounded bottom of the KRX3 enclosure if the cover is not in place.
- Be sure all the TMP cables are properly connected or your K3 will not operate properly.
- Be sure the TMP cable to J85 on the subreceiver module is routed as shown to prevent signal leakage between the KRX3 and the K3 main receiver.

Replacing the Covers

⚠ REPLACE ALL THE SCREWS!

The K3's chassis has excellent rigidity despite its light weight. The screws that hold the top cover in place are an important part of the structural design. Please be sure to replace all the screws and verify they are tight whenever you replace the cover or other panels

☐ Replace the bottom cover(s) using the 4-40 black pan head screws you removed earlier. Note that three locations take the 4-40 1/4" (6.4 mm) black pan head screws with lock washers as shown in Figure 2 while the remainder are 4-40 3/16" (4.8 mm) screws. Be sure to replace all the screws securely, but do not over tighten them!

⚠ CAUTION!

Failure to replace the three 1/4" (6.4 mm) screws and lock washers in the locations shown in Figure 2 may destroy power transistors in your K3!

☐ If you removed it earlier, replace the stiffener bar and attach it to the KPA3 shield with two 4-40, 1/4" (6.4mm) zinc pan head screws with #4 inside tooth lock washers as shown in Figure 19.

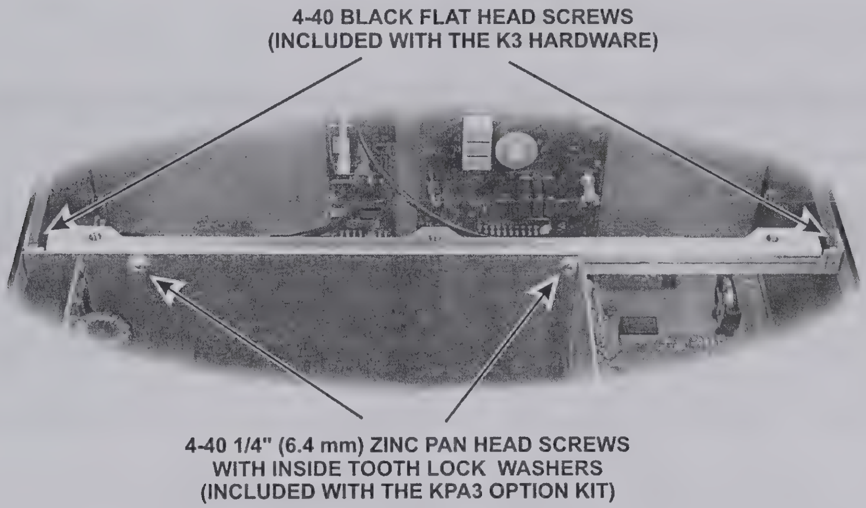

4-40 BLACK FLAT HEAD SCREWS
(INCLUDED WITH THE K3 HARDWARE)
4-40 1/4" (6.4 mm) ZINC PAN HEAD SCREWS
WITH INSIDE TOOTH LOCK WASHERS
(INCLUDED WITH THE KPA3 OPTION KIT)

Figure 19. Installing the Chassis Stiffener Bar.

☐ Hold the top cover above the K3, route the speaker wire under the stiffener bar and plug it into P25 on the KIO3 board at the left rear of the K3 as shown in Figure 20.

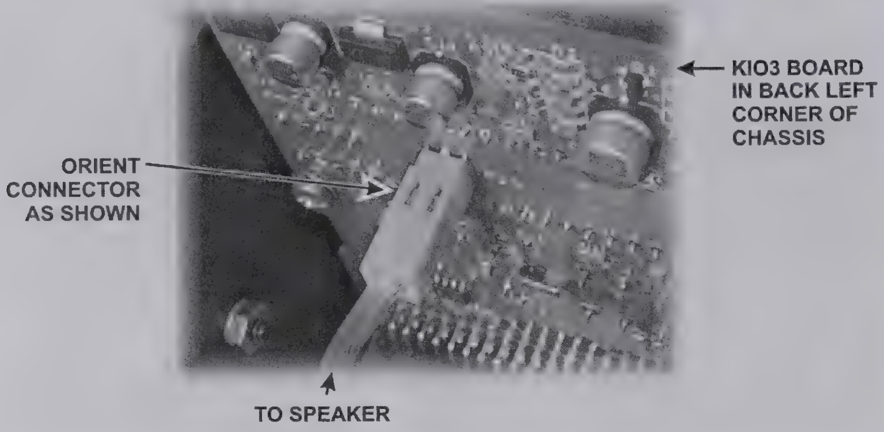

KIO3 BOARD IN BACK LEFT CORNER OF CHASSIS
ORIENT CONNECTOR AS SHOWN
TO SPEAKER

Figure 20. Connecting Speaker Cable.

☐ Position the top cover on the K3. Note that the tab on the back center goes under the rear lip of the K3 rear panel. Secure the top cover with the nine 4-40 3/16" (4.8 mm) black flat head screws you removed earlier.

Configuring and Calibrating the KPA3

⚠ **Your KPA3 will not operate correctly until the following steps are completed!**

☐ Reconnect power and a dummy load capable of dissipating 50 watts to your K3.

☐ Refer to your Owner's manual, turn on your K3 and do the following:

- Enable the KPA3 as described under *Configuration, Option Module Enables*.
- Perform the *PA Temperature Sensor Calibration* as described under *Calibration Procedures* immediately, while the K3's internal temperature is as close to ambient room temperature as possible.

☐ Perform the Transmitter Gain Calibration as follows. **This is essential for your KPA3 to operate properly**.

If you do not have a computer, perform the manual *High Power (50W) TX Gain Calibration* procedure in the *Calibration Procedures, Transmitter Gain* section of your Owner's manual.

If you have a Windows, Linux or Macintosh computer with an RS232 interface and cable, and an internet connection, perform the automated TX Gain calibration using the K3 Utility program as follows:

- Ensure you have the Elecraft K3 Utility Ver. 1.1.12.28 or later on your computer. The utility is available for downloading from the Elecraft web site: www.elecraft.com
- Connect your computer to your K3's RS232 port and start the K3 Utility program.
- Click on the K3 Utility "Configuration" tab, "Calibrate Transmitter Gain…" and follow the instructions to perform the 5-Watt and 50-Watt Transmitter Gain Calibration procedures.

That completes the installation of the KPA3 power amplifier in your K3 transceiver.

Circuit Description

The KPA3 option consists of three subassemblies: the KPA3 power amplifier, a fan panel to provide cooling, and the KPAIO3 interface module.

KPAIO3

The KPAIO3 acts as an interface between the RF board and the KPA3 power amplifier. It includes a relay that allows the KPA3 to be bypassed when it is not needed during low power operation. The cooling fans are also controlled by circuitry on the KPAIO3. There are four fan speeds, plus OFF, selected automatically based on measurement of the KPA3 heat sink temperature.

KPA3 Fan Panel

The KPA3 Fan Panel replaces the blank panel equipped with the K3/10. Two fans are mounted on this panel, along with a circuit breaker to protect the KPA3 from accidental short circuits. The fan panel is connected to the KPAIO3 fan connectors and to the heavy 12-volt connections of the KPA3 module.

KPA3 Power Amplifier

The KPA3 Power Amplifier consists of two RF power transistors operating as a broadband push-pull amplifier; a PIN diode TR switch; and associated bias and control circuitry. The KPA3 provides the necessary gain to increase the power output of the K3 from 10 watts to 100 watts from 1.8 MHz and 54 MHz. A heat sink is provided that, together with the cooling fans, provides the necessary cooling to maintain the operating temperature of the output transistors at a safe level.

The KPA3 is mounted in the K3 with the circuit side of the board down so that only the heat sink is visible after removing the top cover. Each KPA3 is fully tested at the factory and there are no end user adjustments needed during installation.

KT SWP
Rob

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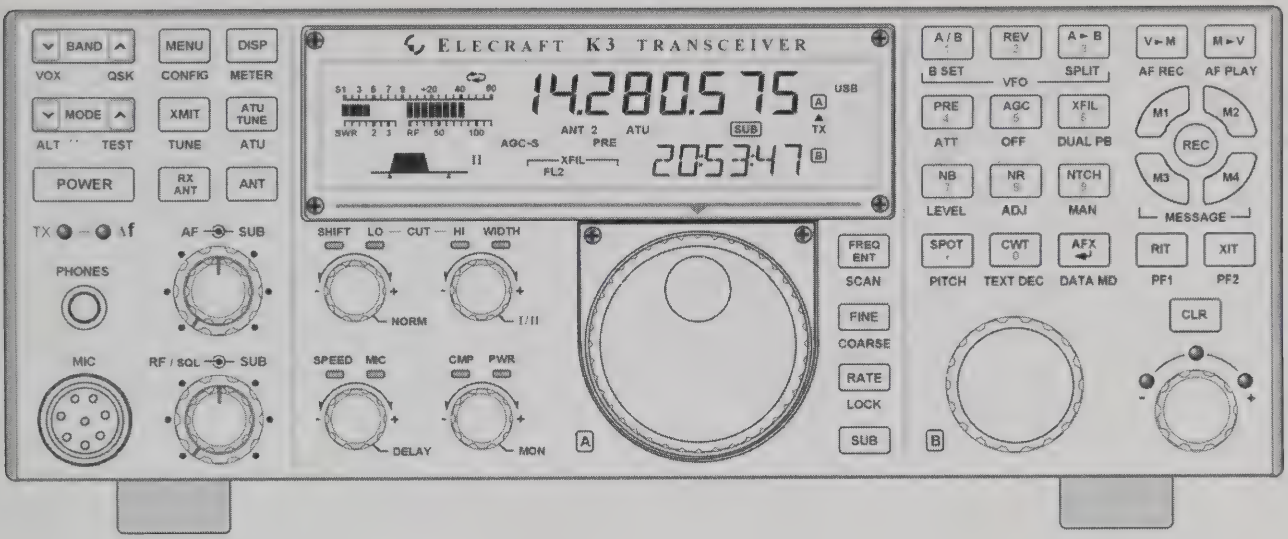

ELECRAFT® K3

HIGH-PERFORMANCE 160 – 6 METER TRANSCEIVER

K3 KIT ASSEMBLY MANUAL

Rev L9, July 2, 2013

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FL3 2.8
FL4 0.4

Contents

- Introduction ... 1
  - Customer Service and Support ... 1
    - Technical Assistance ... 1
- Preventing Electrostatic Discharge Damage ... 3
  - How ESD Damage Occurs ... 3
  - Preventing ESD Damage ... 3
- Preparing for Assembly ... 4
  - Overview of the Kit ... 4
  - Tools and Test Equipment Required ... 6
  - Unpacking and Inventory ... 7
    - Screws ... 7
    - Standoffs ... 8
    - Lock Washers ... 8
- Assembly ... 9
  - RF Board and Chassis ... 10
    - RF Board Description ... 10
    - RF Board and Chassis Assembly Procedure ... 10
  - KANT3 or KAT3, Right Side and Rear Panels ... 18
    - KANT3 or KAT3 Description ... 18
    - Installing KANT3 or KAT3 Antenna Connectors ... 18
    - Installing KRX3 AUX RF (ANT) Connector ... 18
    - Preparing Right Side Panel for Installation ... 21
    - Mounting the KANT3 or KAT3, Side and Rear Panels ... 22
  - KIO3 Interface ... 25
    - KIO3 Description ... 25
    - KIO3 Interface Installation Procedure ... 25
  - Front Panel and DSP ... 28
    - Front Panel and DSP Description ... 28
    - Front Panel Assembly Procedure ... 28
    - Mounting the Subreceiver Auxiliary DSP Board 36
    - Installing the KDVR3 Digital Voice Recorder Option ... 38
    - Mounting the DSP Board Assembly on the Front Panel ... 39
    - Mounting the Front Panel Assembly ... 41
    - Resistance Checks ... 45
    - Initial Power On Check ... 46
  - KREF3 Reference Oscillator ... 46
    - KREF3 Description ... 46
    - KREF3 Installation Procedure ... 46
  - KSYN3 Synthesizer ... 49
    - KSYN3 Description ... 49
    - KSYN3 Installation Procedure ... 49
  - Loudspeaker ... 52
    - Loudspeaker Description ... 52
    - Loudspeaker Installation Procedure ... 52
  - KPA3 Shield ... 54
    - KPA3 Shield Description ... 54
    - KPA3 Shield Installation Procedure ... 54
  - Bottom Cover ... 56
    - Bottom Cover Description ... 56
    - Bottom Cover Hardware Installation Procedure ... 56
  - KNB3 Noise Blanker ... 58
    - KNB3 Noise Blanker Description ... 58
    - KNB3 Installation Procedure ... 58
  - Battery BT1 ... 59
    - Battery BT1 Description ... 59
    - Battery BT1 Installation Procedure ... 59
  - KBPF3 General Coverage Receive Option ... 60
    - KBPF3 Description ... 60
    - KBPF3 Installation Procedure ... 60
  - Power Amplifier Jumper Block ... 61
  - Finishing the Enclosure ... 61
    - Fan Opening Cover ... 61
    - AUX RF Cable ... 61
    - Bottom Covers ... 62
    - Top Cover ... 64
- Test and Calibration ... 66
  - Initial Power Checks ... 66
  - Synthesizer Calibration ... 66
  - Filter Setup ... 67
  - Reference Oscillator Calibration ... 67
  - TX Gain Calibration ... 67
  - Option Modules ... 67
  - Enable Modules ... 67
  - KPA3 100-Watt Amplifier Installation ... 68
  - KRX3 Subreceiver Installation ... 68
  - Other Calibration Procedures ... 68
  - Wattmeter Calibration (Optional) ... 68
  - S-Meter Calibration (Optional) ... 68

- Appendix A, Illustrated Parts List ... A1

ⓘ Elecraft manuals with color images may be downloaded from www.elecraft.com.

Introduction

This manual will guide you through assembly of your Elecraft K3 transceiver. We're confident that you'll find the K3 easy to build, even if you've had no prior kit-building experience.

Every modern transceiver is complex, and the K3 is no exception. The kit includes nearly 300 individual components, including over a dozen PC boards and a multi-element modular chassis. But the K3's unique design eliminates some of the tedious aspects of construction, enabling you to complete assembly in far less time than previous high-performance transceiver kits. Also, virtually all of the alignment is handled in firmware using the K3's built-in test capabilities.

If you should you have difficulty, you'll have our full support via phone and e-mail. In addition, we hope you'll join our growing and enthusiastic community of owner/builders via the Elecraft reflector.

Further information about the Elecraft K3, including specifications, installation, and operation instructions, can be found in the Owner's Manual.

Elecraft manuals with color images may be downloaded from www.elecraft.com.

Customer Service and Support

Technical Assistance

You can send e-mail to K3support@elecraft.com and we will respond quickly - typically the same day Monday through Friday. Telephone assistance is available from 9 A.M. to 5 P.M. Pacific time (weekdays only) at 831-763-4211. Please use e-mail rather than calling when possible since this gives us a written record of the details of your problem and allows us to handle a larger number of requests each day.

Repair / Alignment Service *(We want to make sure everyone succeeds!)*

If necessary, you may return your Elecraft product to us for repair or alignment. (Note: We offer unlimited email and phone support to get your kit running, so please try that route first as we can usually help you find the problem quickly.)

IMPORTANT: You must contact Elecraft before mailing your product to obtain authorization for the return, what address to ship it to and current information on repair fees and turn-around times. (Frequently we can determine the cause of your problem and save you the trouble of shipping it back to us.) Our repair location is different from our factory location in Aptos. We will give you the address to ship your kit to at the time of repair authorization. *Packages shipped to Aptos without authorization will incur an additional shipping charge for reshipment from Aptos to our repair depot.*

Elecraft's 1-Year Limited Warranty

This warranty is effective as of the date of first consumer purchase (or if shipped from factory, date product is shipped to customer). It covers both our kits and fully assembled products. For kits, before requesting warranty service, you should fully complete the assembly, carefully following all instructions in the manual.

Who is covered: This warranty covers the original owner of the Elecraft product as disclosed to Elecraft at the time of order. Elecraft products transferred by the purchaser to a third party, either by sale, gift or other method, who is not disclosed to Elecraft at the time of original order, are not covered by this warranty. If the Elecraft product is being bought indirectly for a third party, the third party's name and address must be provided to Elecraft at time of order to insure warranty coverage.

What is covered: During the first year after date of purchase, Elecraft will replace defective or missing parts free of charge (post-paid). We will also correct any malfunction to kits or assembled units caused by defective parts and materials. Purchaser pays inbound shipping to Elecraft for warranty repair, Elecraft will pay shipping to return the repaired equipment to you by UPS ground service or equivalent to the continental USA and Canada. Alaska, Hawaii and outside U.S. and Canada actual return shipping cost paid by owner.

What is not covered: This warranty does not cover correction of kit assembly errors. It also does not cover misalignment; repair of damage caused by misuse, negligence, or builder modifications; or any performance malfunctions involving non-Elecraft accessory equipment. The use of acid-core solder, water-soluble flux solder, or any corrosive or conductive flux or solvent will void this warranty in its entirety. Also not covered is reimbursement for loss of use, inconvenience, customer assembly or alignment time, or cost of unauthorized service.

Limitation of incidental or consequential damages: This warranty does not extend to non-Elecraft equipment or components used in conjunction with our products. Any such repair or replacement is the responsibility of the customer. Elecraft will not be liable for any special, indirect, incidental or consequential damages, including but not limited to any loss of business or profits.

Preventing Electrostatic Discharge Damage

There is no climate or work location where the components of your K3 are safe from Electrostatic Discharge (ESD) unless you take specific steps to prevent such damage. Many of the components in your K3 can be damaged by static discharges of only a few volts: far too little for you to notice. It is those low-voltage but destructive discharges that easily happen anywhere and under virtually any environmental conditions.

ESD damage may not be apparent at first. The damaged components may not fail completely. Instead, the damage may result in below-normal performance for an extended period of time before you experience a total failure.

How ESD Damage Occurs

Whenever an object containing a static charge touches a circuit in your K3, current will rush into the circuit until the components reach the same voltage as the source of the static charge. If the voltage or current that passes through a component in your K3 during that brief period exceeds its normal operating specifications, it may be damaged or destroyed.

Preventing ESD Damage

ESD damage cannot occur if there is no voltage difference between the components in your K3 and any object that touches them. That is how anti-static packaging works. Anti-static bags allow the static charge to flow over their surface, so that any part of the bag that touches the components inside are all at the same potential at all times. Anti-static foam keeps the leads of sensitive components at the same potential.

At your work bench, avoiding a dangerous voltage is achieved most easily by tying everything together and connecting them to a common mains safety ground. This includes your K3, individual boards or other sensitive components as well as everything they may touch at the work table.

Inexpensive static dissipating work mats are readily-available that will steadily and safely drain off any charges built up on parts or circuit boards placed on them. They are supplied with a lead that connects the mat to the common workbench ground. Also, metal cabinets on test equipment used on the bench should be tied together and connected to the common ground.

Most importantly, you must have a way of continuously draining off any static charges that occur on your body. Such charges are easy to create, even while sitting quietly at the work bench. Moving your feet on the floor, shifting position in your chair or even moving your arms so that clothing rubs against itself can all produce destructive static charges. You can discharge yourself by touching an unpainted metal ground, but that will last only until you move in a way that produces a new static charge. The safest technique is to wear a grounded wrist strap with a series 1-megohm resistor that continuously drains off any charges. Such wrist straps are readily-available and inexpensive.

⚠ ***WARNING***

DO NOT attach a ground directly to yourself without a current-limiting resistor as this poses a serious shock hazard. A wrist strap must include a 1-megohm resistor to limit the current flow. If you choose to touch an unpainted, metal ground to discharge yourself, do it only when you are not touching any live circuits with your other hand or any part of your body.

We strongly recommend you take the following anti-static precautions (listed in order of importance) to avoid trouble:

- Leave ESD-sensitive parts in their anti-static packaging until you install them. The packaging may be a special plastic bag or the component's leads may be inserted in conductive foam. Parts which are especially ESD-sensitive are identified in the parts list and in the assembly procedures.
- Wear a conductive wrist strap with a series 1-megohm resistor. If you do not have a wrist strap, touch a ground briefly before touching any sensitive parts to discharge your body. Do this frequently while you are working. You can collect a destructive static charge on your body just sitting at the work bench. **DO NOT attach a ground directly to yourself as this poses a serious shock hazard.**
- Use a grounded anti-static mat on your work bench.
- If you choose to use a soldering iron to work on your K3 for any reason, be sure the iron is ESD-safe with a grounded tip tied to the same common ground used by your mat or wrist strap.

Preparing for Assembly

Overview of the Kit

The kit comprises two major assemblies: the main chassis and the front panel. Figure 1 shows an assembled K3/10 with its top cover removed.

The main chassis is literally built up around the RF circuit board, which fills the entire bottom of the unit of the chassis assembly. Panels are mounted around the RF board using Elecraft's 2D fasteners. These fasteners allow individual removal of any one panel, if needed, to gain access to the inside of the radio for servicing. Very few cables or wires are used in the kit. Most of the other boards and optional accessories plug directly into the RF board or one of the boards mounted on the RF board.

The front panel assembly, including the display and main operator controls, includes the front panel board and the digital signal processing (DSP) board.

There are many options that you can add to the basic K3/10, such as the 100 watt amplifier module, internal antenna tuner, second receiver, additional crystal I.F. filters, etc. If you purchased these options with your K3 kit, you will find instructions to install them at proper places in the assembly procedure to make getting your complete K3 together and operational in the most efficient manner.

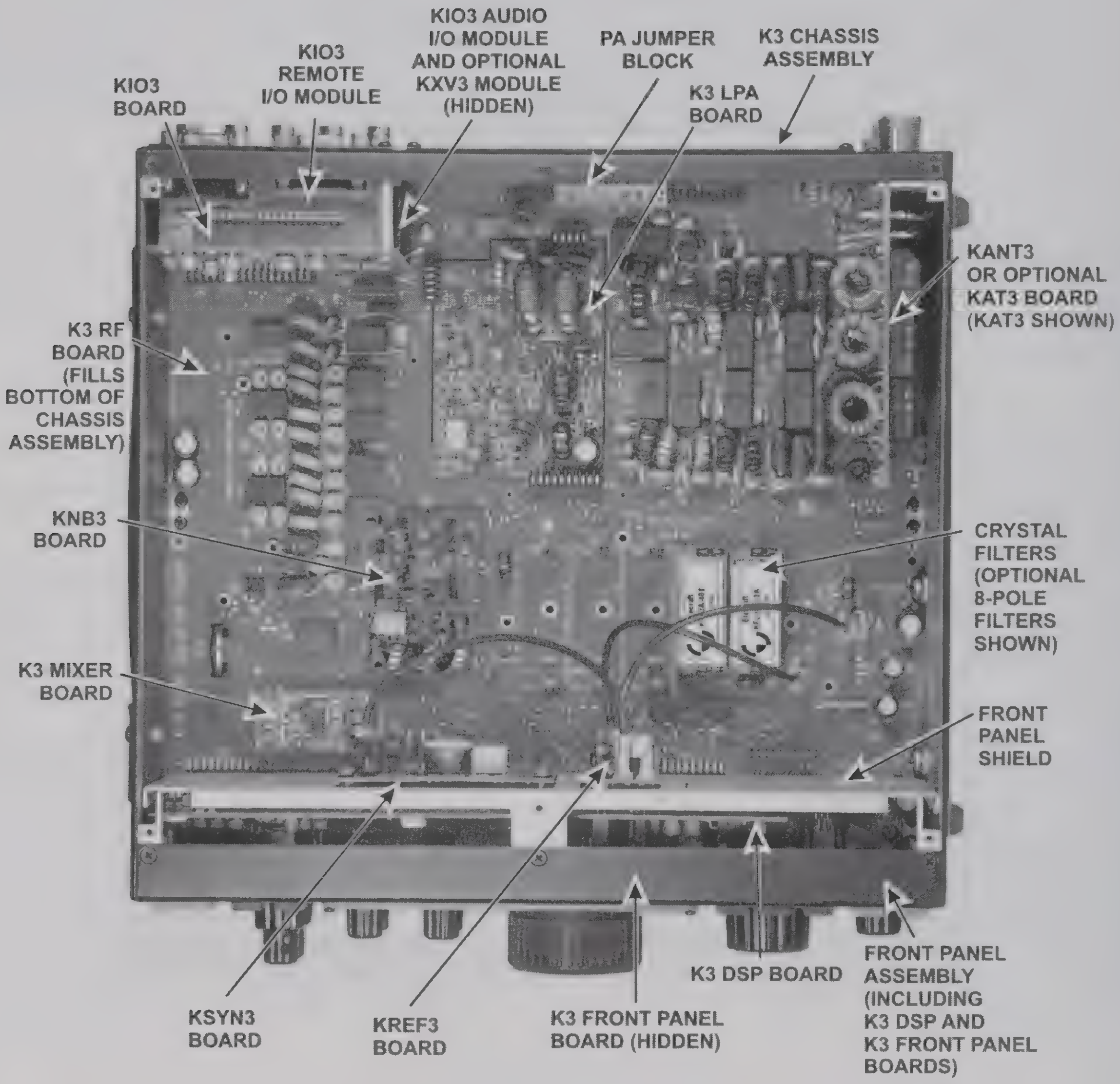

KIO3 BOARD
KIO3 REMOTE I/O MODULE
KIO3 AUDIO I/O MODULE AND OPTIONAL KXV3 MODULE (HIDDEN)
PA JUMPER BLOCK
K3 CHASSIS ASSEMBLY
K3 LPA BOARD
KANT3 OR OPTIONAL KAT3 BOARD (KAT3 SHOWN)
K3 RF BOARD (FILLS BOTTOM OF CHASSIS ASSEMBLY)
KNB3 BOARD
CRYSTAL FILTERS (OPTIONAL 8-POLE FILTERS SHOWN)
K3 MIXER BOARD
FRONT PANEL SHIELD
K3 DSP BOARD
FRONT PANEL ASSEMBLY (INCLUDING K3 DSP AND K3 FRONT PANEL BOARDS)
KSYN3 BOARD
KREF3 BOARD
K3 FRONT PANEL BOARD (HIDDEN)

Figure 1. Typical Assembled K3/10 (Less Top Cover and Chassis Stiffener Bar).

Tools and Test Equipment Required

1. #0 and #1 size Phillips screwdrivers. To avoid damaging screws and nuts, ***do not use a power screwdriver***. Use the screwdriver that best fits the screw in each step.
2. Soft cloth or other surface to lay cabinet panels on to avoid scratching. A clean static-dissipating mat is ideal (see below). ***If using cloth, do not lay circuit boards on it. See Preventing Electrostatic Discharge Damage on page 3***.
3. Pliers or suitable wrenches for tightening 1/4", 3/16" and 1/2" nuts. The 1/2" size is used to tighten nuts on the front panel controls. If available, a deep socket or nut driver is recommended. Pliers or an ordinary wrench can be used, but requires care to avoid damaging the front panel paint.
4. Long nose pliers.
5. Diagonal cutters.
6. Small rule capable of measuring lengths up to 1" (2.5 cm) with an accuracy of at least 1/16" inch (1.6 mm).
7. Digital Multimeter (DMM) for resistance checks.
8. RF 50-ohm, 5 W (minimum) dummy load with low VSWR from 160 meters through 6 meters.
9. Power supply 13.8 VDC nominal (11-15 V) with a cable and Anderson PowerPole® connector. A power cable kit is provided with your K3 if you do not have a suitable cable with the required Anderson PowerPole connector. The power supply must be capable of providing at least 3 Amperes for a K3/10 and 20 Amperes for a K3/100. (See *Specifications* in your Owner's manual for more information on power supply recommendations).

The following tools are strongly recommended:

1. ESD wrist strap.
2. Static dissipating work mat.

Optional Equipment:

1. RF Power Meter with accurate readout from 1 mW to 5 watts, minimum.
2. Signal generator with calibrated 50 uV output at 20 or 40 meters.

In addition, two Allen wrenches, 5/64" (2mm) and .050", are supplied with your kit.

Unpacking and Inventory

⚠ *CAUTION*

Do not handle the circuit boards without anti-static protection! Doing so may damage sensitive components. See *Preventing Electrostatic Discharge Damage* on page 3 for important information before proceeding.

Before starting construction, do a complete inventory, comparing the parts in your kit with the parts list in Appendix A, to familiarize yourself with all of the parts and to ensure the kit is complete. When inventorying, look in the sealed envelopes to identify their contents, but not mix them up. Some screws are very similar in length, but must be used in the correct locations described in the procedure to avoid damaging your K3. A paper clip or piece of tape will hold the envelopes closed after you check their contents. Note that a few extras of some screws, nuts and washers may have been included on purpose.

All dimensions given in the assembly procedure are provided in both US customary (often called English) and metric measurements. The native dimensions of the parts are in US Customary units. Approximate metric equivalents are given to assist those more familiar with that system to identify the correct parts.

Screws

A number of different types and sizes of screws and washers are used in the assembly. It is very important that you use the screw specified in each location or your finished K3 may not fit together properly. In some places, using the wrong size screw may damage components. The following various screw types and sizes specified in the text are shown in Figure 2. Images are shown for comparing relative sizes. They are not to scale. The lengths of the screws called for in the text are measured as shown.

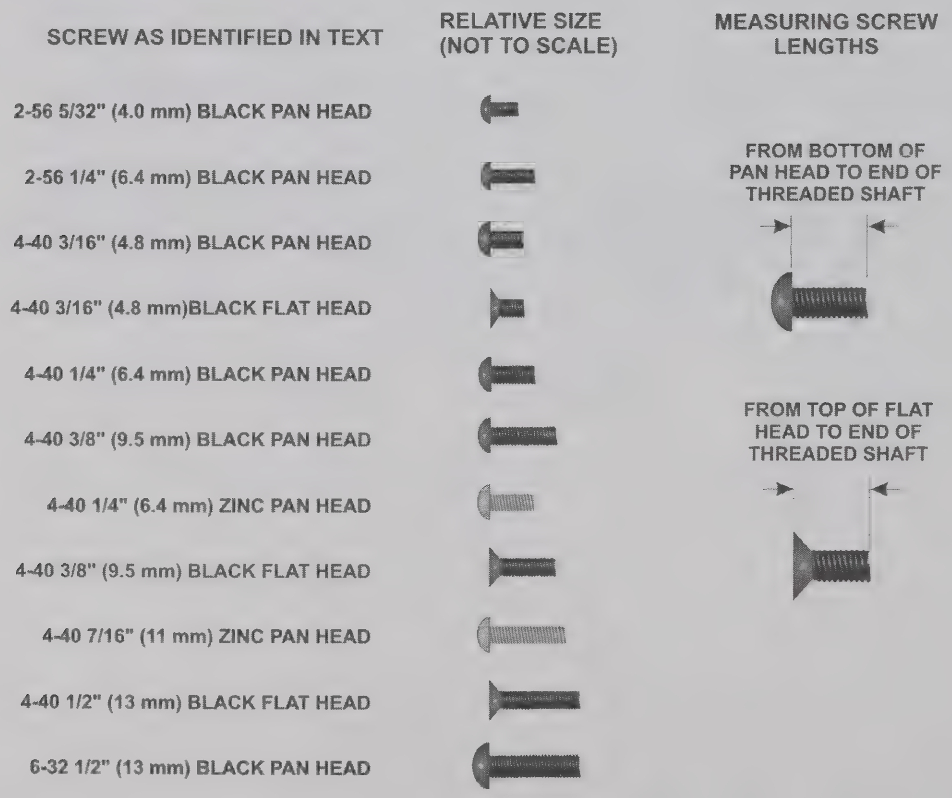

SCREW AS IDENTIFIED IN TEXT
RELATIVE SIZE (NOT TO SCALE)
MEASURING SCREW LENGTHS
2-56 5/32" (4.0 mm) BLACK PAN HEAD
2-56 1/4" (6.4 mm) BLACK PAN HEAD
4-40 3/16" (4.8 mm) BLACK PAN HEAD
4-40 3/16" (4.8 mm)BLACK FLAT HEAD
4-40 1/4" (6.4 mm) BLACK PAN HEAD
4-40 3/8" (9.5 mm) BLACK PAN HEAD
4-40 1/4" (6.4 mm) ZINC PAN HEAD
4-40 3/8" (9.5 mm) BLACK FLAT HEAD
4-40 7/16" (11 mm) ZINC PAN HEAD
4-40 1/2" (13 mm) BLACK FLAT HEAD
6-32 1/2" (13 mm) BLACK PAN HEAD
FROM BOTTOM OF PAN HEAD TO END OF THREADED SHAFT
FROM TOP OF FLAT HEAD TO END OF THREADED SHAFT

Figure 2. Screw Sizes Used in Assembly.

Standoffs

A number of threaded standoffs are used. As with the screws and washers, be sure you use the correct size as specified in the text. Standoff lengths are measured from end to end as shown in Figure 3. Standoffs threaded for 2-56 and 4-40 screws are used.

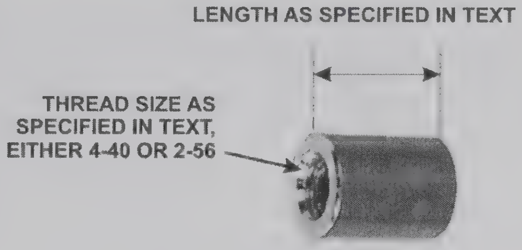

LENGTH AS SPECIFIED IN TEXT
THREAD SIZE AS SPECIFIED IN TEXT, EITHER 4-40 OR 2-56

Figure 3. Typical Standoff.

Lock Washers

Two types of lock washers are used in the K3 (see Figure 4). It is important that you use only the type specified and put the washers exactly where indicated. Failing to use the correct type may result in short circuits to nearby circuit traces. Adding washers or placing the washers in the wrong position may cause parts to fail to fit together properly.

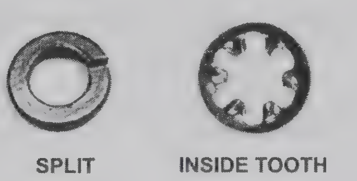


Figure 4. Lock Washers.

Assembly

⚠ *IMPORTANT ASSEMBLY INFORMATION*

1. Screws and other Fasteners: A variety of screws and fasteners are used to assemble your K3:
   - **Stainless Steel Hardware Kit:** If you purchased the optional hardware kit that provides stainless steel hardware for the external fasteners, the letters (SS) are included in the procedure wherever you should use the stainless steel parts instead of the parts supplied with this kit.
   - **Use your rule to check the length of screws and standoffs before installing them**. Some components are only 1/16" different from others but using the wrong size may result in parts not fitting correctly, possibly damage electrical and mechanical components. See *Screws* on page 7 and *Standoffs* on page 8 for more measurement instructions.
   - **Loosen screws as needed for a proper fit.** When mounting parts with multiple screws or adjacent parts that fit together, such as the exterior cabinet panels, loosen adjacent mounting screws as needed to adjust the parts for the best fit. Be certain you re-tighten the screws before proceeding.
   - **Ensure all screws are tight.** A loose screw can cause both mechanical and electrical problems such as intermittent operation, unexpected noise or false signals (birdies) in the receiver.
   - **Threads can be easily stripped** if too much force is applied when tightening screws. Use the correct size hand tool and apply only moderate torque. Do not use a power screwdriver!
2. Brief circuit descriptions are provided through the manual for those interested in the functions of the circuits. For more detailed circuit information, consult the Theory of Operation in your Owner's manual.

⚠ *CAUTION – TO AVOID DEGRADING THE PERFORMANCE OF YOUR K3:*

DO NOT DISTURB ANY ADJUSTMENTS ON THE BOARDS!

Each board was tested and aligned for optimum performance at the factory. Any change to these adjustments will degrade the performance of your K3 or prevent its operation altogether. All user calibrations and adjustments are done in firmware using the front panel menus. These are described at the appropriate points in the assembly procedures.

DO NOT ADJUST THE TURNS ON ANY TOROIDS!

The position of the turns on the cores of many toroids has been adjusted at the factory to produce exactly the inductance needed for the circuit to work properly. Any attempt to adjust their position or to make a coil look "nicer" may seriously degrade circuit performance.

Also, do not attempt to fix the turns or coils in place with adhesives or other materials. Those toroids needing support have been fixed at the factory. Adding material to the other toroids will alter their inductance, again degrading circuit performance.

ESD SENSITIVE!

Observe ESD precautions when handling the circuit boards and whenever you are working on your K3 with the covers off. Failure to observe ESD precautions may result in your K3 not operating at all, or operating but not meeting normal factory performance specifications due to damaged components. See page 2 for more information.

RF Board and Chassis

RF Board Description

The RF PCB (Printed Circuit Board) is the heart of the K3 transceiver, both physically and electrically. During assembly, it serves as an attachment point for other PCBs as well as chassis panels, acting as the glue that holds things together. During operation, the RF board provides signal routing to and from all modules. For more information, see *Theory of Operation, RF Board*, in the K3 Owner's Manual.

RF Board and Chassis Assembly Procedure

CAUTION

There are components on both sides of the circuit boards. When handling them, be careful not to damage components on either side by placing the board on top of tools or other objects, or bumping or crushing the components while mounting parts or installing the boards

☐ Remove the RF board from its anti-static packaging. The top side of the board is the side with the toroid inductors and relays along with other components, including several connectors along one edge. The edge with the connectors is the back edge of the board, while the front edge has notches cut in it that will fit around front panel controls. Locate the six rectangular bare copper pads for the 2D fasteners (see Figure 5). There is one in each corner of the board and one in the center of each side (see Figure 11 on page 14).

ESD SENSITIVE!

WEAR A GROUNDED
WRIST STRAP OR TOUCH
AN UNPAINTED METAL GROUND
BEFORE HANDLING THE RF BOARD.

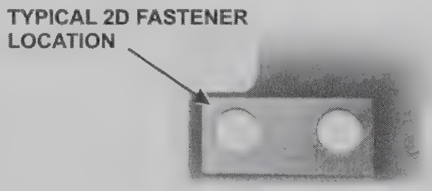


Figure 5. 2D Fastener Location on RF Board.

☐ Install 2D fasteners at the six spaces provided (one at each corner and at the center of each side of the RF board). Mount the fasteners on the *bottom* side of the board as shown in Figure 6. Be sure the 2D fasteners are oriented so the side of each fastener lines up with the edge of the RF board as shown.

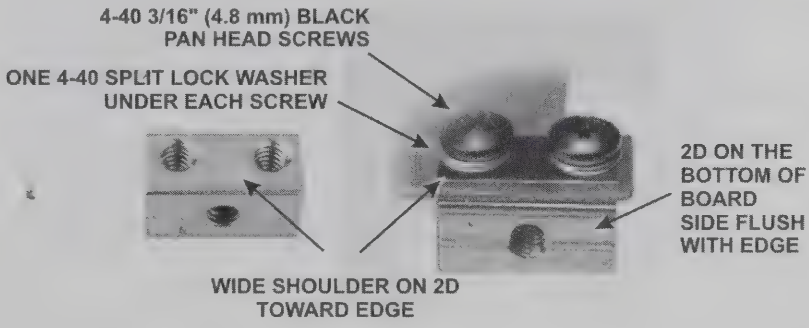

4-40 3/16" (4.8 mm) BLACK PAN HEAD SCREWS
ONE 4-40 SPLIT LOCK WASHER UNDER EACH SCREW
2D ON THE BOTTOM OF BOARD SIDE FLUSH WITH EDGE
WIDE SHOULDER ON 2D TOWARD EDGE

Figure 6. Installing 2D Fasteners on RF Board.

☐ Install a 4-40 3/8" (9.5 mm) standoff on the RF board near connector Z1 as shown in below and Figure 11 on page 14. This standoff will support the mixer to be installed later. Install the standoff using ***three*** lock washers as shown below with two of the lock washers between the standoff and the RF board.

⚠ CAUTION: To avoid damaging the circuit trace between R74 and the metal ring around the mixer standoff screw hole, position the lock washer under the screw head with the split facing away from the trace, then tighten the assembly by turning the standoff while holding the screw and lock washer stationary.

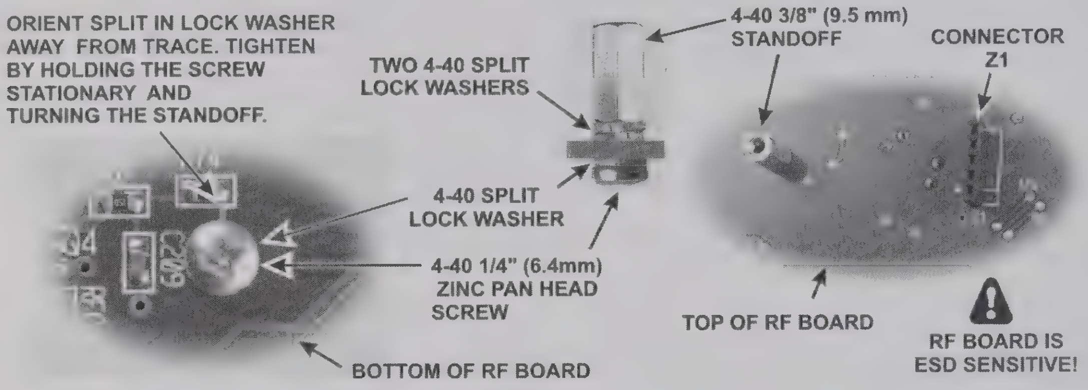

ORIENT SPLIT IN LOCK WASHER AWAY FROM TRACE. TIGHTEN BY HOLDING THE SCREW STATIONARY AND TURNING THE STANDOFF.
TWO 4-40 SPLIT LOCK WASHERS
4-40 3/8" (9.5 mm) STANDOFF
CONNECTOR Z1
4-40 SPLIT LOCK WASHER
4-40 1/4" (6.4mm) ZINC PAN HEAD SCREW
TOP OF RF BOARD
RF BOARD IS ESD SENSITIVE!
BOTTOM OF RF BOARD

Figure 7. Installing Mixer Standoff.

☐ Install the two KBPF3 standoffs shown in Figure 8. Even if you didn't purchase the KBPF3 general coverage option, the standoffs and hardware are included in the K3 kit to make installing the option easier at some future date. Note that these standoffs have only ***one*** lock washer between each standoff and the RF board

⚠ Note that one standoff is very close to the toroid coils. The standoff may touch the coil. That will not affect circuit performance. If you wish, you may adjust the position of the coil slightly to avoid contact. .

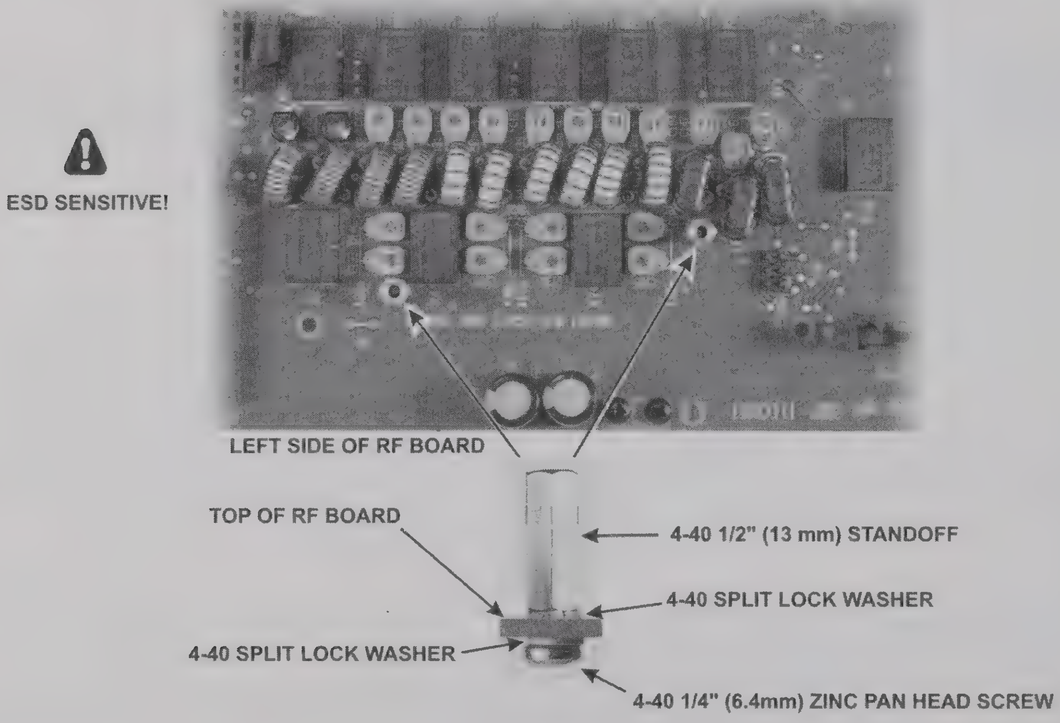


Figure 8. Installing KBPF3 Standoffs.

☐ Install hardware to attach Q3 to the RF board near the rear left corner as shown in Figure 9 and Figure 11 on page 14.

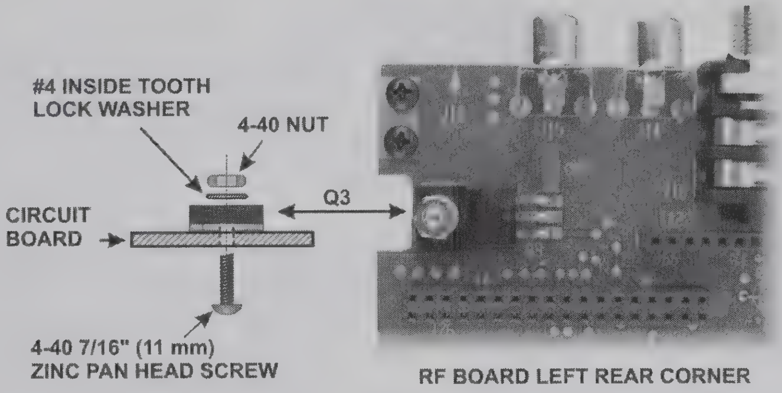

#4 INSIDE TOOTH LOCK WASHER
4-40 NUT
Q3
CIRCUIT BOARD
4-40 7/16" (11 mm) ZINC PAN HEAD SCREW
RF BOARD LEFT REAR CORNER

Figure 9. Installing Q3 Hardware.

☐ Locate the crystal I.F. filters. Two types of filters are available: standard 5-pole filters and optional 8-pole filters (see Figure 10). One standard 5-pole 2.7 kHz filter is supplied. If you have elected to equip your K3 with the optional 8-pole 2.8 kHz filter, it has been supplied instead of the 2.7 kHz filter. If you have purchased additional filters, they may be installed now as well. If you plan to add filters later, spaces may be left for them. For example, if you plan to add the FM or a 6 kHz AM filter later, you can leave spaces FL1 and FL2 open for them and install the 2.8 kHz filter in position FL3. The filters are not hard to move about later, so if you aren't sure, install the widest at FL1, the next widest at FL2 and so on.

☐ Enter the following data on Table 1.You will need this information to set up your filters after assembling your K3. Be sure you're following the rule described in the step above about the proper order for the filters. Note that Table 1 is set up with FL1 to the right and FL5 to the left, just as they must be installed on the RF board.

Enter the bandwidth of each filter in the row below the filter position in which it will be installed.

Enter the FREQ OFFSET shown on each filter. The optional 8-pole filters have no offset marked on them. Enter a zero in the FREQ OFFSET column for those filters. **For the 5-pole filters, note that the frequency offset may be *negative*, indicated by a minus sign (single dash) ahead of the number.**

Table 1. Filters Installed.

Note: FL1 is to the right and FL5 is to the left. In the next step you will install the filters right-to-left on the RF board as well.

POSITION	FL5	FL4	FL3	FL2	FL1[1]
BANDWIDTH[2]		400 Hz	2.8kc		
FREQ OFFSET[3]			0		

1. **If you're installing the K-FL3B FM filter, place it in FL1 position since it is the widest bandwidth filter available.**
2. **The bandwidth is shown in the label attached to the filters except the K-FL3B FM filter. Record a bandwidth of 13 kHz for the K-FL3B FM filter.**
3. **All of the optional 8-pole filters have an offset of zero. Note that the 5-pole filters may have a negative offset, indicated by a minus sign ahead of the number.**

☐ Install the filters as shown in Figure 10. Refer to the list of filters you created in Table 1 to determine which filter to install at each location.

CAUTION

1) Do not use screws longer than 1/4" (6.4 mm) to mount the filters. Use your ruler to measure the screws before installing them. Longer screws may extend into the optional 8-pole filter and destroy it. We strongly recommend you use a 1/4" screw even when installing the 5-pole filters to reduce the possibility of damaging an 8-pole filter should you change them later.

2) Do not over-tighten the screws. Too much torque may pull the threaded bushing out of the bottom of the filter module.

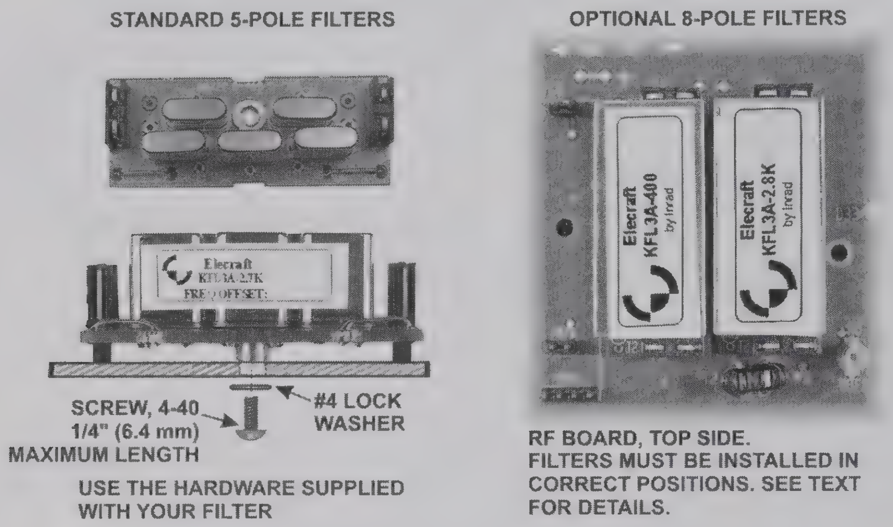


Figure 10. Installing Crystal I.F. Filters.

☐ Locate the K3 top cover. On the inside is a label with places to record the bandwidth (BW), and frequency offset (FRQ) of each filter. Copy the information from Table 1 and place a check mark by Main (for main receiver) on the label. Use pencil in case you change your filters later. This will keep the filter information with your K3. The label also has a row for Gain. This is a value you can determine later after your K3 is assembled and aligned. It is a value set in the K3's MENU to adjust the overall gain for each roofing filter so the audio remains constant when switching from one filter to another. Making this adjustment is described under *Filter Loss Compensation* in your owner's manual.

ESD SENSITIVE!

**WEAR A GROUNDED
WRIST STRAP OR TOUCH
AN UNPAINTED METAL GROUND
BEFORE HANDLING THE RF BOARD.**

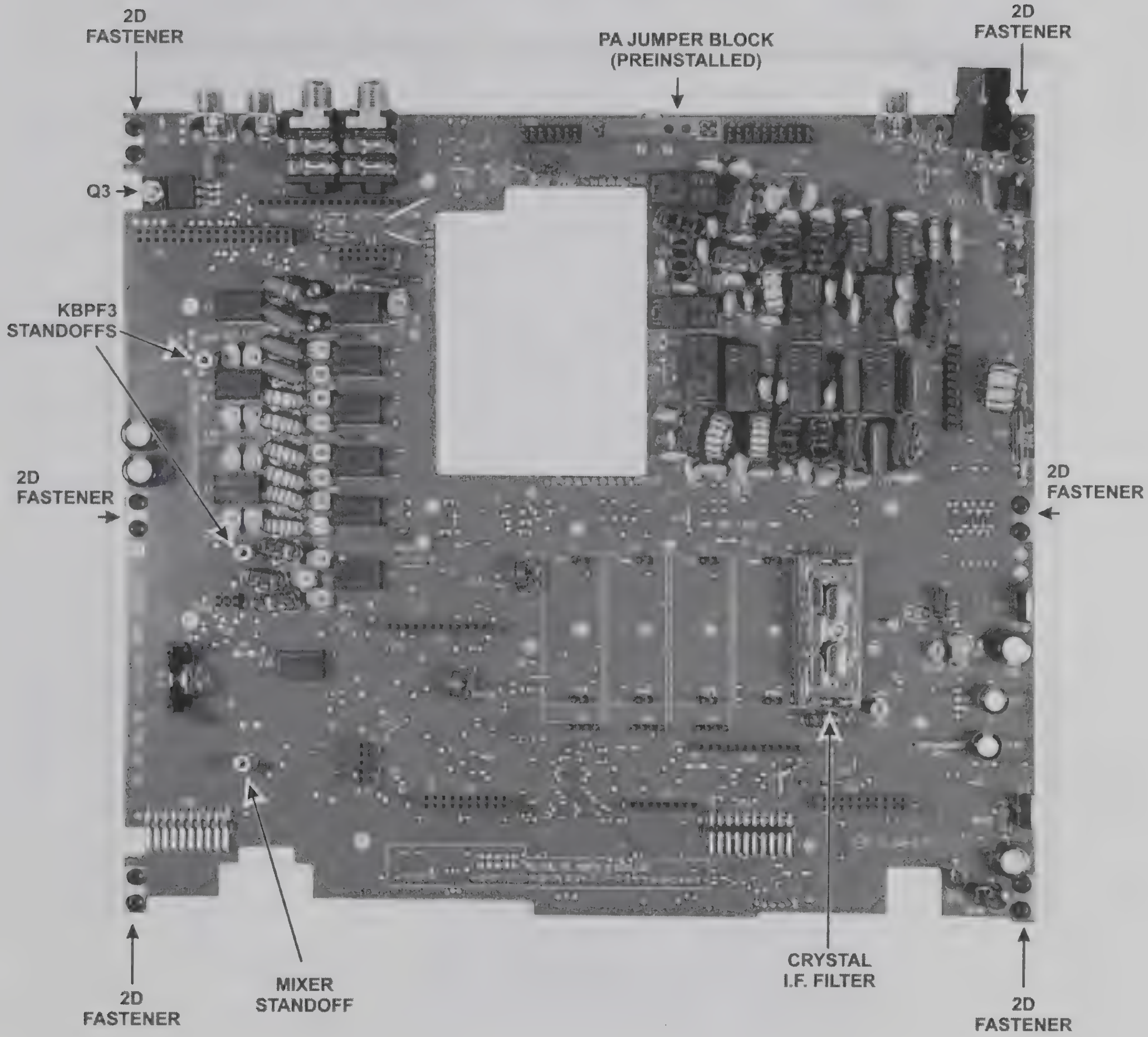
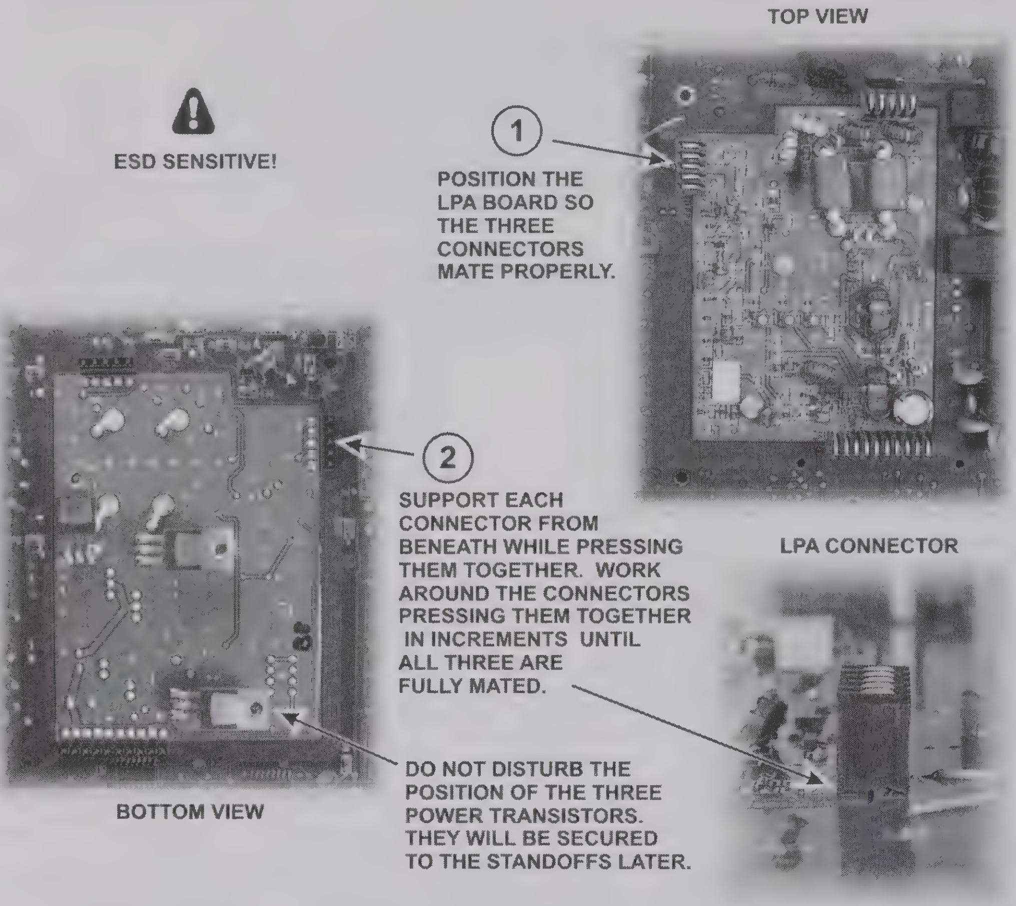


Figure 11. RF Board Partially Assembled.

☐ Install the Low Power Amplifier (LPA) board in the cutout on the RF board as shown in Figure 12. The LPA board is held in place by its connectors until the bottom cover is installed..


TOP VIEW

ESD SENSITIVE!

① POSITION THE LPA BOARD SO THE THREE CONNECTORS MATE PROPERLY.

② SUPPORT EACH CONNECTOR FROM BENEATH WHILE PRESSING THEM TOGETHER. WORK AROUND THE CONNECTORS PRESSING THEM TOGETHER IN INCREMENTS UNTIL ALL THREE ARE FULLY MATED.

LPA CONNECTOR

BOTTOM VIEW

DO NOT DISTURB THE POSITION OF THE THREE POWER TRANSISTORS. THEY WILL BE SECURED TO THE STANDOFFS LATER.

Figure 12. Installing the Low Power Amplifier (LPA).

☐ Check all three LPA connectors shown in Figure 12 to ensure they are fully mated as shown. If they are not fully mated, the transistors will not rest against the K3 bottom cover as required when it is fitted later.

☐ Mount a 2D fastener on each ear of the front panel shield, and then mount the shield on the RF board as shown in Figure 13. Be sure the 2D fasteners are oriented with the widest part between the two holes and the edge toward the outside as shown.

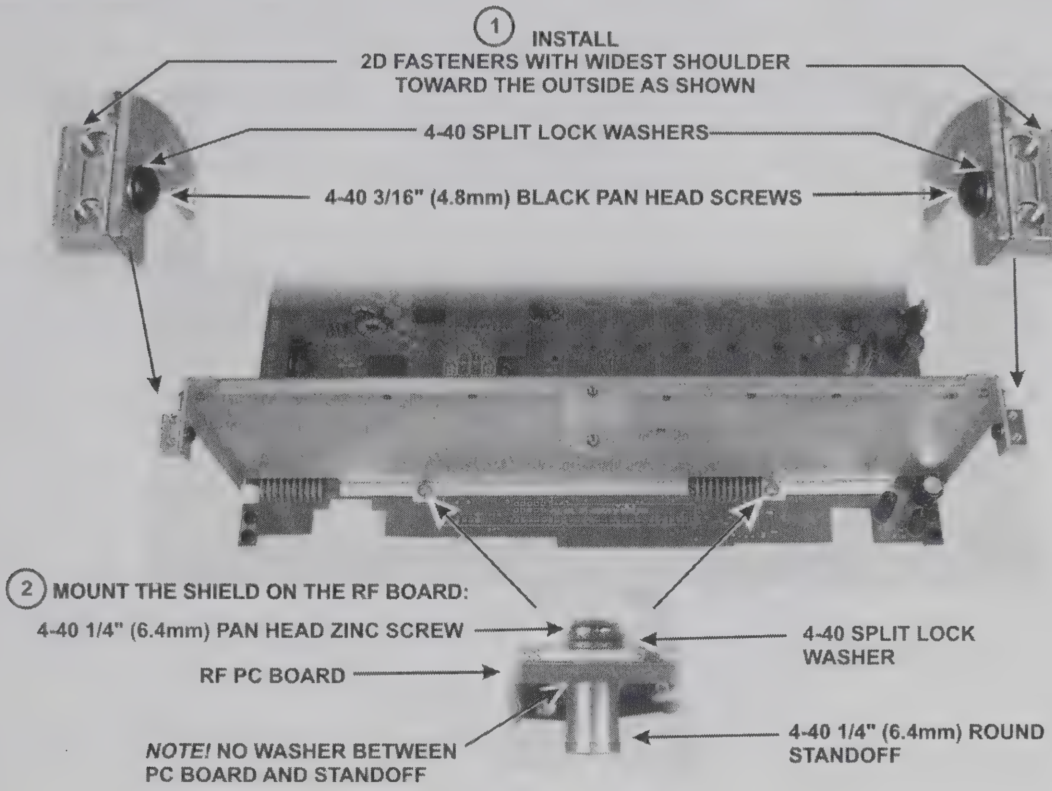

① INSTALL
2D FASTENERS WITH WIDEST SHOULDER TOWARD THE OUTSIDE AS SHOWN
4-40 SPLIT LOCK WASHERS
4-40 3/16" (4.8mm) BLACK PAN HEAD SCREWS
② MOUNT THE SHIELD ON THE RF BOARD:
4-40 1/4" (6.4mm) PAN HEAD ZINC SCREW
RF PC BOARD
NOTE! NO WASHER BETWEEN PC BOARD AND STANDOFF
4-40 SPLIT LOCK WASHER
4-40 1/4" (6.4mm) ROUND STANDOFF

Figure 13. Installing Front Panel Shield.

☐ Mount the K3 mixer board on the RF board as shown in Figure 14. The mixer plugs into Z1 on the RF board.

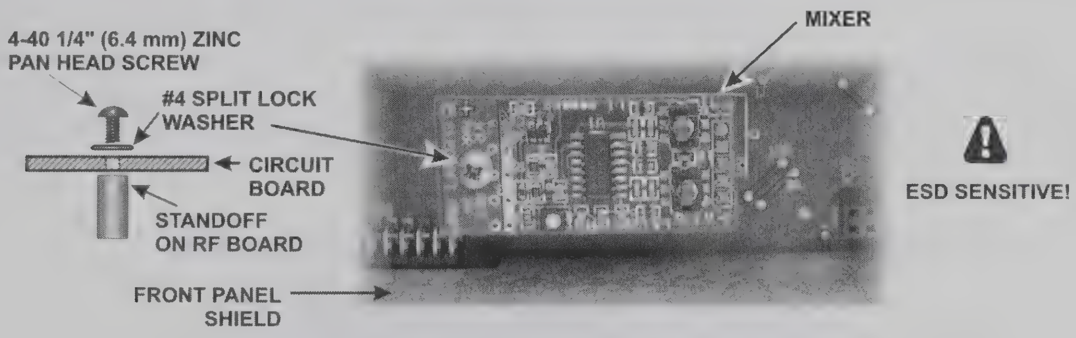


Figure 14. Installing Mixer Board.

☐ Locate the two side panels. They are approximately 4" (10 cm) by 9-7/8" (25 cm) in size. Both panels have six counter-sunk screw holes near the edges. Note that the countersunk holes are farther from one end than the other. This is important. You will need to orient the panels correctly as you install them. The side panels are different as well. In addition to the six counter-sunk screw holes, the left side panel has two holes near the centerline for attaching the handle and three larger counter-sunk holes near the top edge. The left side panel with the handle attached is shown in Figure 16. The right side panel has six additional holes; four for mounting the side feet and two for attaching other parts inside the K3 (see Figure 21). Set the right side panel aside for now.

☐ Check the inside (partially painted) of both panels to ensure no masking tape is covering any screw holes. If found, peel it off.

☐ Attach the handle to the left side cover using the hardware shown in Figure 15 at each end. The ribbed side of the handle faces away from the panel. Tighten the screws enough to compress the lock washers, but do not tighten the screws so much that you deform the handle end cover. The handle should move easily to allow room for your fingers between the handle and cover for carrying, then lie flat against the cover when it is not in use.

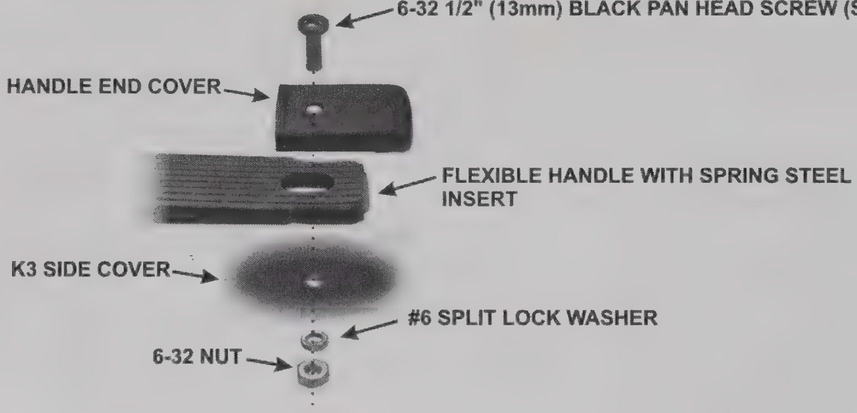

6-32 1/2" (13mm) BLACK PAN HEAD SCREW (SS)
HANDLE END COVER
FLEXIBLE HANDLE WITH SPRING STEEL INSERT
K3 SIDE COVER
#6 SPLIT LOCK WASHER
6-32 NUT

Figure 15. Installing Side Handle Mounting Hardware.

☐ Install three 6-32, 1/4" (6.4 mm) screws in the larger holes in the side panel shown in Figure 16. Use a #6 nut and split ring lock washer on the inside to secure each screw. These holes are for mounting the optional K144XV 2-meter module. The screws are provided to fill them when the option is not installed.

☐ Attach the left side panel to the RF board assembly as shown in Figure 16 using five 4-40 3/16" (4.8 mm) black flat head screws (SS). Do ***not*** use washers. When oriented correctly, the edge of the panel will extend about 1/2" (13 mm) past the 2D fasteners at the front panel shield. If needed, loosen the screws attaching the 2D fasteners to the RF board or front panel shield for best alignment. Tighten them again after the side panel is installed.

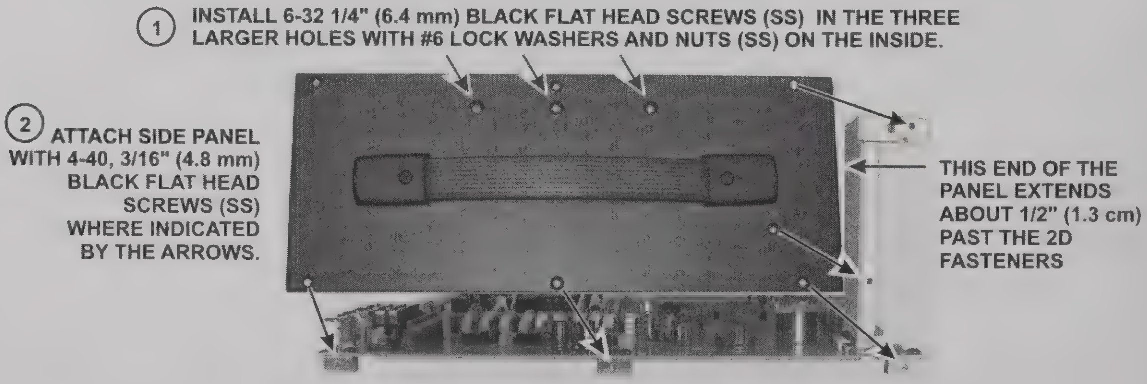

① INSTALL 6-32 1/4" (6.4 mm) BLACK FLAT HEAD SCREWS (SS) IN THE THREE LARGER HOLES WITH #6 LOCK WASHERS AND NUTS (SS) ON THE INSIDE.
② ATTACH SIDE PANEL WITH 4-40, 3/16" (4.8 mm) BLACK FLAT HEAD SCREWS (SS) WHERE INDICATED BY THE ARROWS.
THIS END OF THE PANEL EXTENDS ABOUT 1/2" (1.3 cm) PAST THE 2D FASTENERS

Figure 16. Mounting Left Side Panel.

☐ Mount a 2D fastener at the top back corner of the left side panel (the one you just installed) with a 4-40 3/16" (4.8 mm) black flat head screw (SS) as shown in Figure 17. Do ***not*** use washers. Be sure the 2D fastener is oriented correctly as shown in the figure.

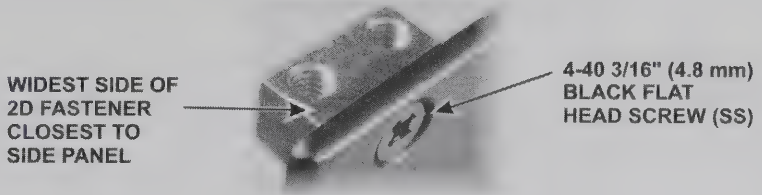

WIDEST SIDE OF 2D FASTENER CLOSEST TO SIDE PANEL
4-40 3/16" (4.8 mm) BLACK FLAT HEAD SCREW (SS)

Figure 17. Installing Left Side Panel 2D Fastener.

KANT3 or KAT3, Right Side and Rear Panels

⚠ If you purchased a KAT3 with your kit, you did not get a KANT3 board with your kit. For more information, see the *KANT3 AND KAT3 Circuit Description* below.

KANT3 or KAT3 Description

The basic K3/10 includes a KANT3 antenna input module. If you've ordered a KAT3 antenna tuner, the KANT3 is not required and will not be supplied with the kit. In either case, the module plugs into the RF board at the back-right corner. Both the KANT3 and KAT3 provide antenna surge protection, as well as resistors for bleeding off static DC charge. The KAT3 provides a wide-range, switchable C-in/C-out L-network. See *Theory of Operation, KANT3 and KAT3*, in the K3 Owner's Manual for more details.

Installing KANT3 or KAT3 Antenna Connectors

☐ Locate the rear panel and check the inside for any masking tape still covering screw holes. If found, peel it off.

☐ Mount the SO239 connector in the ANT1 position on the rear panel using two 4-40 1/4" (6.4 mm) black pan head screws (SS), two 4-40 inside tooth lock washers and two 4-40 nuts as shown in Figure 18. The flange of the SO239 connector is on the inside (unpainted side) of the rear panel.

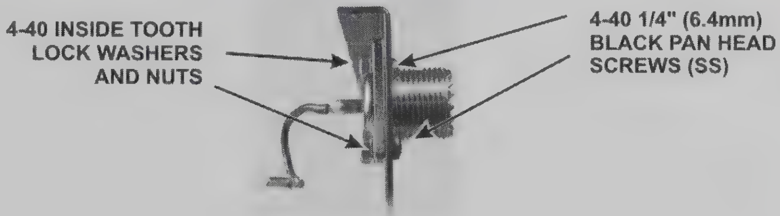

4-40 INSIDE TOOTH LOCK WASHERS AND NUTS
4-40 1/4" (6.4mm) BLACK PAN HEAD SCREWS (SS)

Figure 18. Mounting the ANT1 Connector.

☐ If you are installing the KAT3, install the second SO239 connector in the ANT2 position on the rear panel using two 4-40 1/4" (6.4 mm) black pan head screws (SS), two 4-40 inside tooth lock washers and two 4-40 nuts just as you did for the ANT1 connector. Set the rear panel aside for now.

Installing KRX3 AUX RF (ANT) Connector

If you do not have the KRX3 Subreceiver option kit on hand, skip this section and go directly to *Preparing Right Side Panel for Installation* below to continue assembly.

If you have the KRX3 Subreceiver option kit on hand, you may wish to install the AUX RF antenna connector at this time. The AUX RF connector is one optional way to connect an antenna to the subreceiver. Before you decide, turn to your *KRX3 Installation and Operation* Manual and review the *Auxiliary KRX3 Antenna Input (Optional)* section. It is not necessary to install the connector now, even if you decide to use it. Complete instructions for installing it later are included in your KRX3 manual.

If you wish to install the AUX RF connector now, do so as follows.

☐ Retrieve the following components from your KRX3 Subreceiver kit:

- Coaxial cable with a pre-mounted BNC female panel connector on one end and a TMP connector on the other end (TMP connectors are shown in Figure 74 on page 51).
- Nut and inside tooth lock washer that fits the BNC connector. (They may be supplied threaded onto the connector. If so, remove them.)
- One 4-40 3/8” (9.5 mm) black pan head screw.
- One #4 inside tooth lock washer.
- One 4-40 nut.

☐ The highly scratch-resistant powder coating on the rear panel may interfere with the fit of the BNC connector through the hole. Remove the coating around the edge of the hole using a hobby knife or other sharp tool (see Figure 19). Note that the hole is flat at the top. That is intentional.

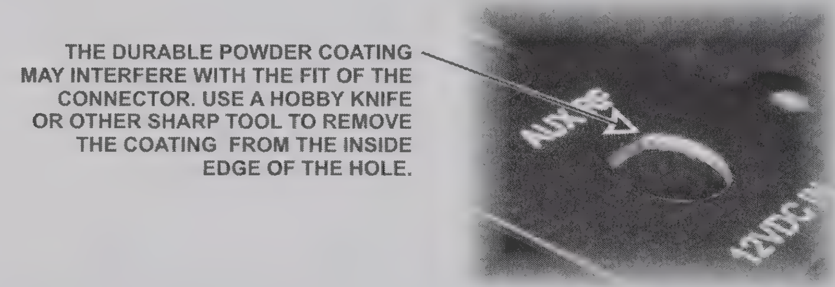

THE DURABLE POWDER COATING MAY INTERFERE WITH THE FIT OF THE CONNECTOR. USE A HOBBY KNIFE OR OTHER SHARP TOOL TO REMOVE THE COATING FROM THE INSIDE EDGE OF THE HOLE.
AUX RF
12VDC

Figure 19. Removing the Powder Coating from the AUX RF Connector Hole.

☐ Thread the BNC/TMP cable through the AUX RF connector hole from the outside, lining up the flat on the threaded section of the connector with the flat at the top of the hole. Slide the lock washer and nut onto the cable. Fold the solder lug on the braid down against the coax to fit through the back panel hole, the lock washer and the nut. Thread the nut onto the connector and tighten it (see Figure 20).

☐ Mount the solder lug attached to the braid as shown in Figure 20, using a 4-40 3/8" (9.5mm) black pan head screw (SS), #4 inside tooth lock washer and 4-40 nut. If you have the KAT3 option, there will be a shorter screw holding the connector flange. Replace it with the 3/8" (9.5 mm) screw. If you do not have a KAT3, there will be no connector in the ANT2 hole. In that case, the solder lug is directly against the unpainted inside surface of the rear panel.

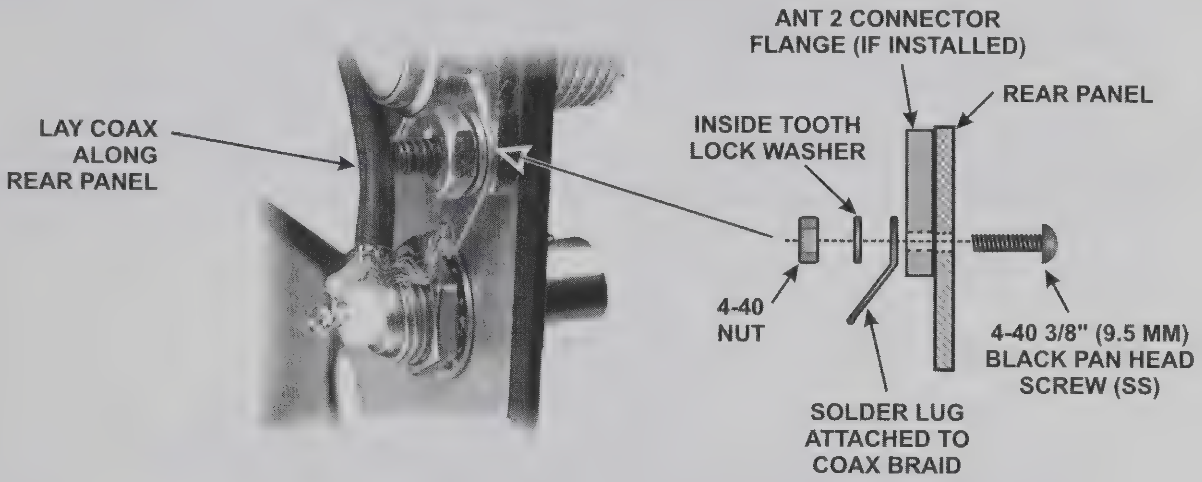

ANT 2 CONNECTOR FLANGE (IF INSTALLED)
REAR PANEL
LAY COAX ALONG REAR PANEL
INSIDE TOOTH LOCK WASHER
4-40 NUT
4-40 3/8" (9.5 MM) BLACK PAN HEAD SCREW (SS)
SOLDER LUG ATTACHED TO COAX BRAID

Figure 20. Installing the AUX RF Connector.

☐ Carefully insulate the metal TMP connector, covering all of the metal parts with electrical tape or other suitable material that you can remove easily later.

⚠ CAUTION

Later you will apply power to do preliminary testing and calibration before the KRX3 Subreceiver is installed. Failure to insulate the TMP connector as described above may result in short circuits and extensive damage to your K3 if it touches a component, solder pad or other exposed circuit points.

Preparing Right Side Panel for Installation

☐ Install the four rubber side feet in the holes in the right side panel as shown in Figure 21. Two suggested procedures for doing this are as follows:

Press Method:

- Wet the tip of the foot with a ***tiny*** amount of soap. (Do not use petroleum jelly or oils. They can deteriorate the rubber over time).
- Place the foot, tip up, on a solid work surface.
- Position the panel with the outside (fully painted side) toward the foot with the hole in the panel against the tip and press down. The tip should slip through the hole without further help. If necessary, grip the tip and pull with your long-nose pliers, working it from side to side until the shoulder opens against the inside of the panel. ***Do not use excessive force. You can tear the foot apart.***
- Wipe any excess soap off of the panel or foot.

Twist Method:

- Press the foot against the outside (fully painted side) of the panel so the tip is in the hole at an angle.
- While pressing the tip into the hole, twist the foot so the edge of the tip grabs the inside edge of the hole.
- Continue pressing and twisting until the tip is fully inside the panel all the way around its circumference. ***Do not twist with excessive force. You can tear the foot apart.***

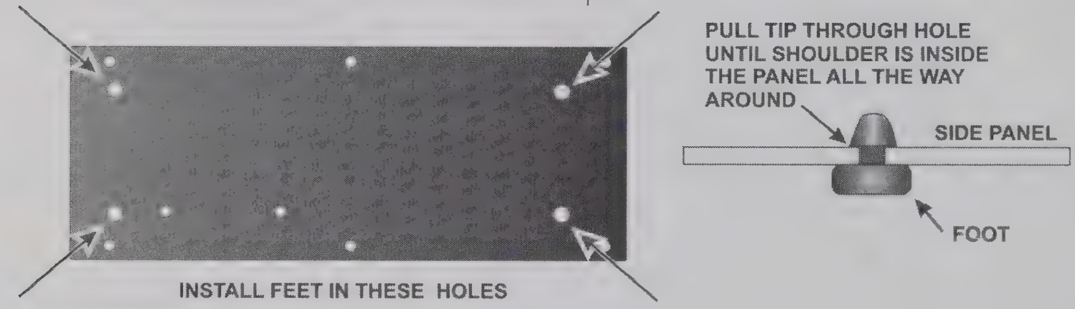

INSTALL FEET IN THESE HOLES
PULL TIP THROUGH HOLE UNTIL SHOULDER IS INSIDE THE PANEL ALL THE WAY AROUND
SIDE PANEL
FOOT

Figure 21. Installing Side Panel Feet.

☐ Position the right side panel against the K3 to verify how it will fit against the RF board. When it is oriented correctly, the three holes along the bottom edge will line up with the holes in the 2D fasteners on the RF board and two holes in the side panel will be aligned with the tabs on voltage regulators U12 and U13. The end of the panel toward the rear will very nearly line up flush with the edge of the RF board. Do not mount the side panel yet, but note which corner of the panel is in the upper rear corner. You'll work with this corner in the next step.

☐ At the upper rear corner of the side panel you just identified in the previous step, mount a 2D fastener as shown in Figure 22, using a black 4-40 1/2" (13 mm) flat head screw (SS). Remember that flat head screws are measured from the flat top to the end of the threads. Note that the screw extends some distance through the 2D fastener.

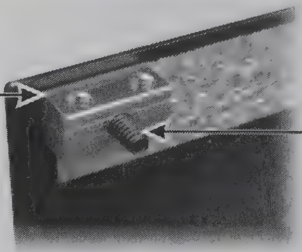

WIDEST SHOULDER OF THE 2D CONNECTOR NEAREST THE SIDE PANEL
1/2" (13 mm) BLACK FLAT HEAD SCREW (SS)

Figure 22. Mounting 2D fastener for KANT3 or KAT3 Standoff.

☐ Screw a 4-40 1/2" (13 mm) standoff onto the exposed end of the screw as shown in Figure 23. ***Do not use a lock washer between the standoff and the 2D fastener.*** Tighten the standoff securely against the 2D fastener. Set the side panel aside temporarily.

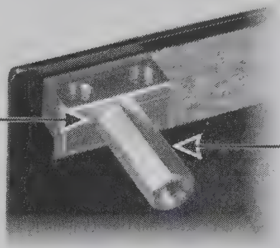
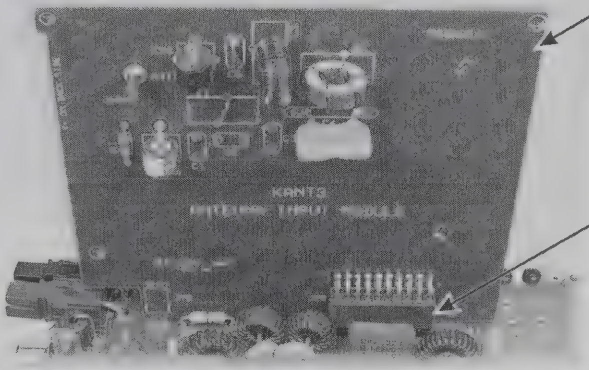

NO WASHER BETWEEN STANDOFF AND 2D FASTENER
1/2" (13 mm) 4-40 HEX STANDOFF

Figure 23. KANT3/KAT3 Mounting Standoff.

Mounting the KANT3 or KAT3, Side and Rear Panels

☐ Insert J70 on the KANT3 or the KAT3 board into P70 near the red and black APP power connectors at the right rear corner of the RF board. The KANT3 board is shown in Figure 24. The KAT3 board fits exactly the same way ***with the toroidal inductors toward the center of the RF board***. I


KANT3 BOARD SHOWN. OPTIONAL KAT3 GOES HERE REPLACING THE KANT3.
BE SURE J70 IS FULLY MATED TO P70 ON THE RF BOARD

⚠ NOTE:

DUE TO DESIGN CHANGES, L3 MAY NOT BE PRESENT. (YOU MAY SEE CLIPPED LEADS WHERE IT WAS REMOVED. THAT IS NORMAL.) ALSO, ON SOME BOARDS C6 AND C6 MAY NOT BE PRESENT.

Figure 24. Installing the KANT3 or KAT3 Board.

☐ Peel the backing from the self-adhesive serial number label and attach it to the back panel as shown in Figure 25. You may wait until the assembly is finished before attaching the serial number, but at this point you can lay the panel flat on the work surface to easily position the label square within the outline.

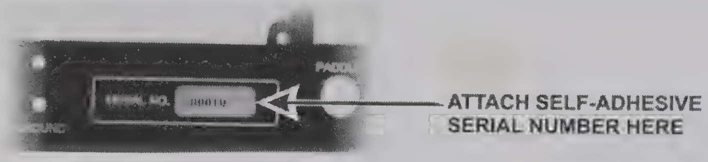


Figure 25. Attaching Serial Number.

☐ Position the rear panel on the K3 chassis assembly so that the SO239 connector(s) are at the end nearest the KANT3 or KAT3 board. If installed, the coax cable attached to the AUX RF connector should pass between the rear panel and the KAT3 or KANT3 board (see Figure 26). Thread the 6-32 thumbscrew into the ground terminal position near the center of the rear panel as shown in Figure 27. Use two #6 flat washers between the thumbscrew and the back panel as shown. If the hole in the rear panel does not line up with the threaded hole in the ground bracket mounted on the RF board, loosen the side panel screws at the end nearest the rear panel so you can adjust the position of the rear panel as needed.

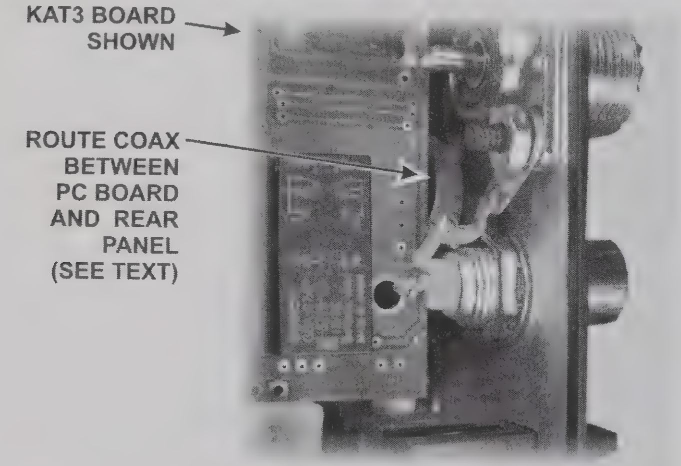


Figure 26. Routing AUX RF Connector Coax.

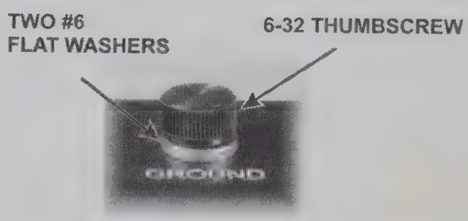


Figure 27. Installing Rear Panel Ground Screw

☐ If you loosened the side panel screws in the previous step, tighten them again now.

☐ Attach the bottom lip of the rear panel to the 2D fasteners at the rear corners of the RF board with 4-40, 3/16" (4.8 mm) black ***pan head*** screws (SS). (Note that all the screws used on the bottom of the K3 are black pan head screws.)

☐ Connect the wires from the SO239 connector(s) to the KANT3 or KAT3 board as shown in Figure 28. Use needle-nose pliers to grip the terminals on the wire ends and carefully insert the connectors ***straight*** into the holes in the board. They may be very difficult to insert unless they are perfectly aligned. While inserting the plugs, support the board with your fingers to avoid putting stress on the connector at the bottom.

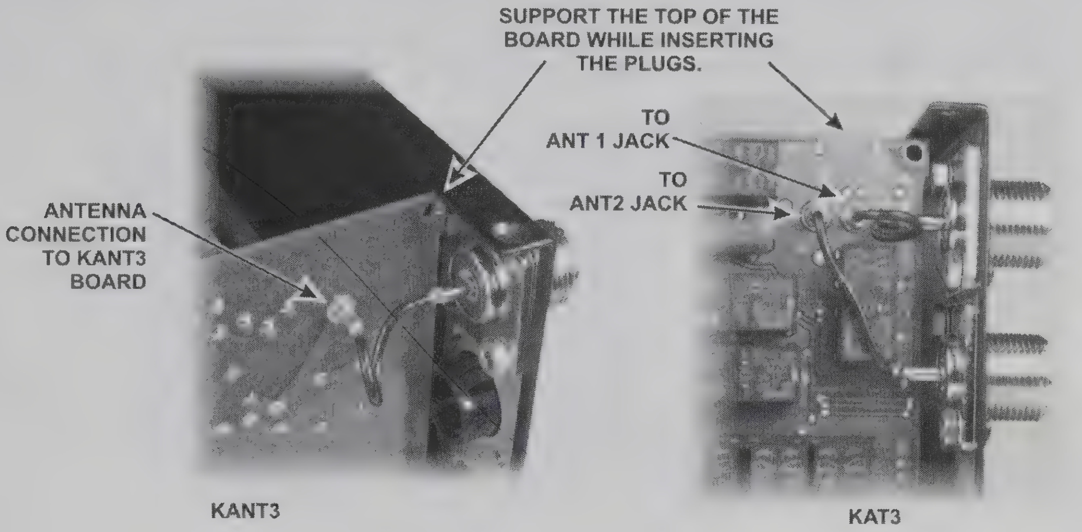

SUPPORT THE TOP OF THE BOARD WHILE INSERTING THE PLUGS.
TO ANT 1 JACK
TO ANT2 JACK
ANTENNA CONNECTION TO KANT3 BOARD
KANT3
KAT3

Figure 28. ANT Connections to KANT3 or KAT3 Boards.

☐ Attach the right side panel to the RF board assembly four 4-40 3/16" (4.8mm) black flat head screws: three along the bottom and one at the top front into the 2D fastener on the front panel shield. Do ***not*** use washers. Note that there are two open holes for screws to secure voltage regulators U12 and U13. They will be installed later.

☐ Mount the KANT3 or KAT3 board to the standoff on the side panel with a 4-40 1/4" (6.4mm) zinc pan head screw and a #4 split lock washer under the screw head as shown in Figure 29. ***Do not place a washer between the board and the standoff.***

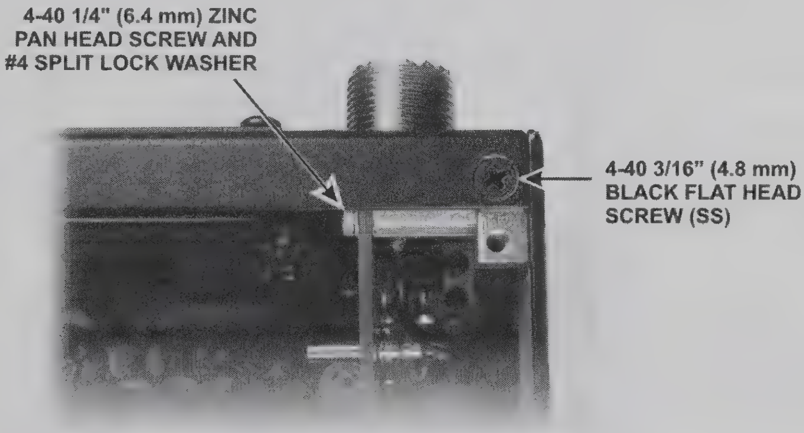

4-40 1/4" (6.4 mm) ZINC PAN HEAD SCREW AND #4 SPLIT LOCK WASHER
4-40 3/16" (4.8 mm) BLACK FLAT HEAD SCREW (SS)

Figure 29. Installing KANT3/KAT3 Mounting Screw.

☐ Install a 4-40 3/16" (4.8 mm) black flat head screw (SS) to secure the top of the rear panel to the 2D fastener as shown in Figure 29

☐ Install another 4-40 3/16" (4.8 mm) black flat head screw (SS) at the opposite end of the rear panel to secure it to the top 2D fastener on the left side panel. When properly positioned, the rear panel should fit snugly against the inside edge of the side panel as shown in Figure 29. Verify the fit is correct at both ends. If necessary loosen the 2D fastener screws enough to adjust the position of the panels. .

☐ If you installed the KANT3 board, the hole for the ANT2 jack is not used. Insert the larger of the hole plugs in the opening until it clicks in place (see Figure 30).

☐ If you do not have the K3EXREF option, insert one of the smaller hole plugs in the REF connector at the bottom right. Align the open side of the plug with the flat side of the hole as shown in Figure 30. If the plug does not have a cutout, use your diagonal cutters to clip out a section of the plug so it will fit into the hole. Similarly, install the other small plug in the AUX RF opening if the subreceiver connector was not installed.

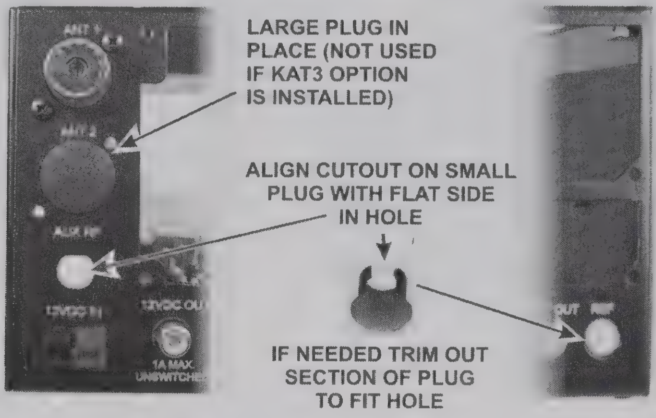

ANT 1
ANT 2
AUX RF
12VDC IN
12VDC OUT
1A MAX UNSWITCHED
OUT
REF
LARGE PLUG IN PLACE (NOT USED IF KAT3 OPTION IS INSTALLED)
ALIGN CUTOUT ON SMALL PLUG WITH FLAT SIDE IN HOLE
IF NEEDED TRIM OUT SECTION OF PLUG TO FIT HOLE

Figure 30. Installing Rear Panel Hole Plugs.

KIO3 Interface

KIO3 Description

All rear-panel audio and digital/computer I/O is routed through the KIO3. The KIO3 is made up of three PC boards: Main, Audio I/O and Digital I/O. The Main KIO3 board plugs directly into the RF board, while the Audio and Digital I/O modules plug into the KIO3 main board. All three boards can be upgraded to meet future requirements. See *Theory of Operation, KIO3*, in the K3 Owner's Manual for more information.

KIO3 Interface Installation Procedure

☐ If you have purchased the KXV3 option with your kit, go to the *Installation Procedure* in the KXV3 manual and install the option now, following the instructions in the *Special Note to K3 Kit Builders*. Otherwise mount the small blank panel in the space directly above PADDLE, KEY, PTT and KEY OUT connectors on the rear panel as shown in Figure 31.

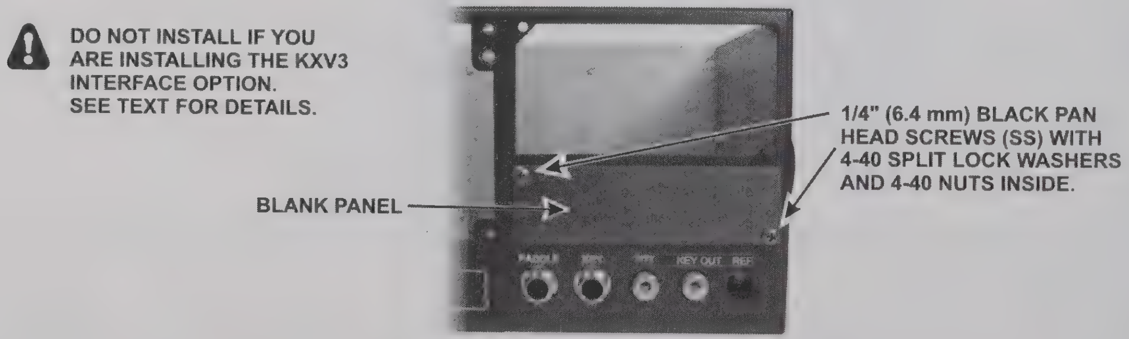

DO NOT INSTALL IF YOU ARE INSTALLING THE KXV3 INTERFACE OPTION. SEE TEXT FOR DETAILS.
BLANK PANEL
1/4" (6.4 mm) BLACK PAN HEAD SCREWS (SS) WITH 4-40 SPLIT LOCK WASHERS AND 4-40 NUTS INSIDE.
PADDLE
KEY
PTT
KEY OUT
REF

Figure 31. Preparing Rear Panel for KIO3 Installation.

☐ Mount two 1-1/4" (31.8 mm) standoffs in the two holes on the KIO3 board as shown in Figure 32 using a zinc 4-40 1/4" (6.4 mm) screw and inside tooth lock washer at each standoff. One is in the corner and the other is about half way down the opposite side of the board. ***Do not put lock washers between the standoffs and the board.***

☐ Plug the Audio I/O daughter board into J91 as shown in Figure 32. The second daughter board will be installed later.

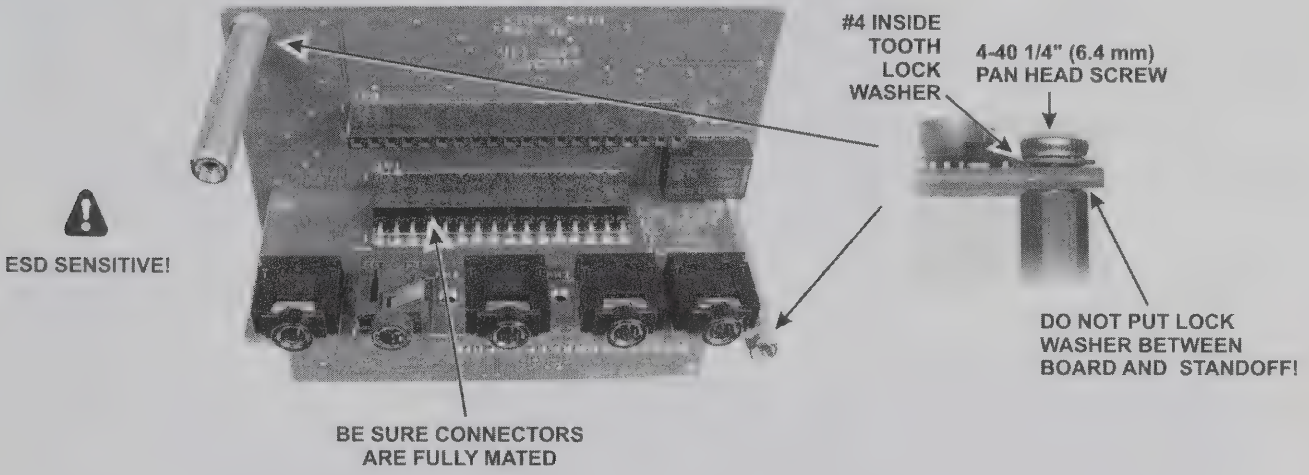

#4 INSIDE TOOTH LOCK WASHER
4-40 1/4" (6.4 mm) PAN HEAD SCREW
ESD SENSITIVE!
DO NOT PUT LOCK WASHER BETWEEN BOARD AND STANDOFF!
BE SURE CONNECTORS ARE FULLY MATED

Figure 32. Preparing the KIO3 Board for Installation.

☐ Install the KIO3 Main board with the Audio I/O daughter board attached into the K3 as shown in Figure 33. The KIO3A main board plugs into J76 on the RF board. If the KXV3 is installed, the coaxial TMP cable fits between the KXV3 and KIO3 boards. Ensure the connectors are fully mated so the standoffs line up with the screw holes on the rear panel.

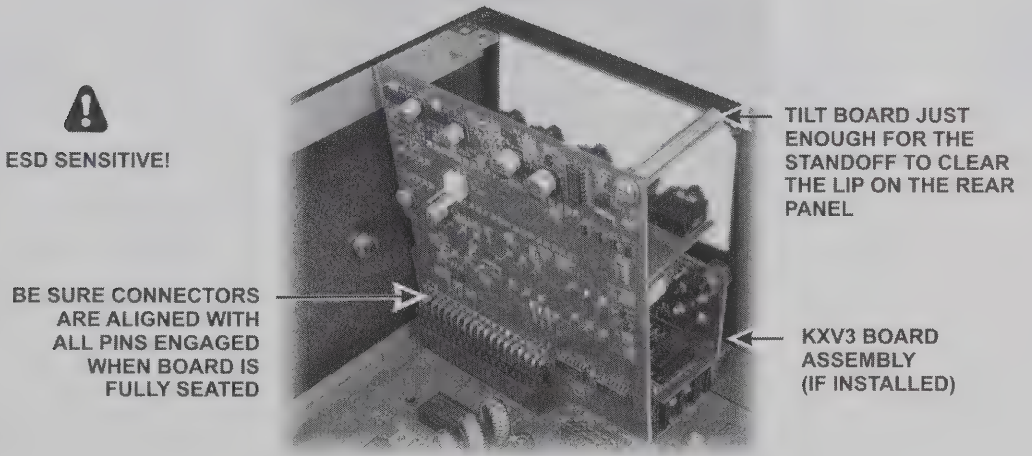
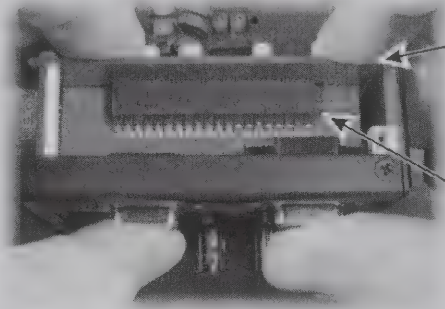

ESD SENSITIVE!
TILT BOARD JUST ENOUGH FOR THE STANDOFF TO CLEAR THE LIP ON THE REAR PANEL
BE SURE CONNECTORS ARE ALIGNED WITH ALL PINS ENGAGED WHEN BOARD IS FULLY SEATED
KXV3 BOARD ASSEMBLY (IF INSTALLED)

Figure 33. Installing KIO3 Main Board.

☐ The DB9 multi-pin connector on the KIO3 Digital I/O daughter board may have jackscrew nuts installed on the connector. (Jackscrew nuts are shown in Figure 35). If so, remove them. They will be reinstalled shortly.

☐ Install the KIO3 Digital I/O daughter board as shown in Figure 34. Be careful to support the KIO3 main board as shown while pressing the daughter board in place.

ESD SENSITIVE!

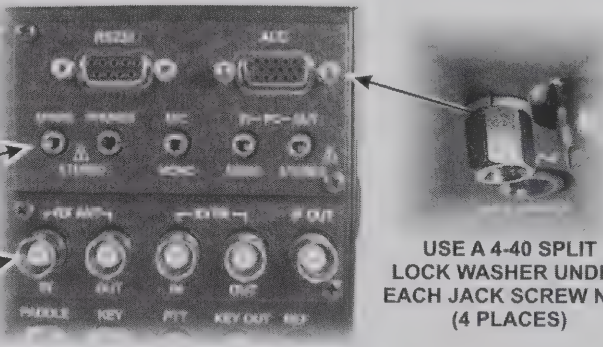


SUPPORT THE KIO3 MAIN BOARD WHILE PRESSING THE DIGITAL I/O BOARD IN PLACE.

BE SURE THE PINS ARE PROPERLY ALIGNED AND THE CONNECTORS ARE FULLY MATED

Figure 34. Installing the KIO3 Digital I/O Board.

☐ Install the KIO3 rear panel as shown in Figure 35.



4-40 1/4" (6.4 mm) BLACK PAN HEAD SCREW (SS) (NO WASHER) IN EACH CORNER

BE SURE AUDIO JACKS ARE ALIGNED WITH PANEL CUTOUTS

KXV3 INTERFACE OPTION (IF INSTALLED)

USE A 4-40 SPLIT LOCK WASHER UNDER EACH JACK SCREW NUT (4 PLACES)

Figure 35. Mounting the KIO3 Connector Panel.

Front Panel and DSP

Front Panel and DSP Description

The Front Panel is a large plug-in module that provides the K3's user interface (LCD, switches, shaft encoders, potentiometers, and LEDs) as well as the microcontroller (MCU) and parameter storage (EEPROM and FLASH). It also includes the 32-bit DSP assembly, which processes all AF and IF signals. See *Theory of Operation, Front Panel and DSP*, in the K3 Owner's Manual.

Front Panel Assembly Procedure

CAUTION

Do not use inside tooth lock washers where split lock washers are specified. Inside tooth lock washers are slightly larger and may short nearby circuit pads.

☐ Mount three standoffs on the back of the front panel board as shown in Figure 36 . Place the lock washer between the screw head and the board as shown.

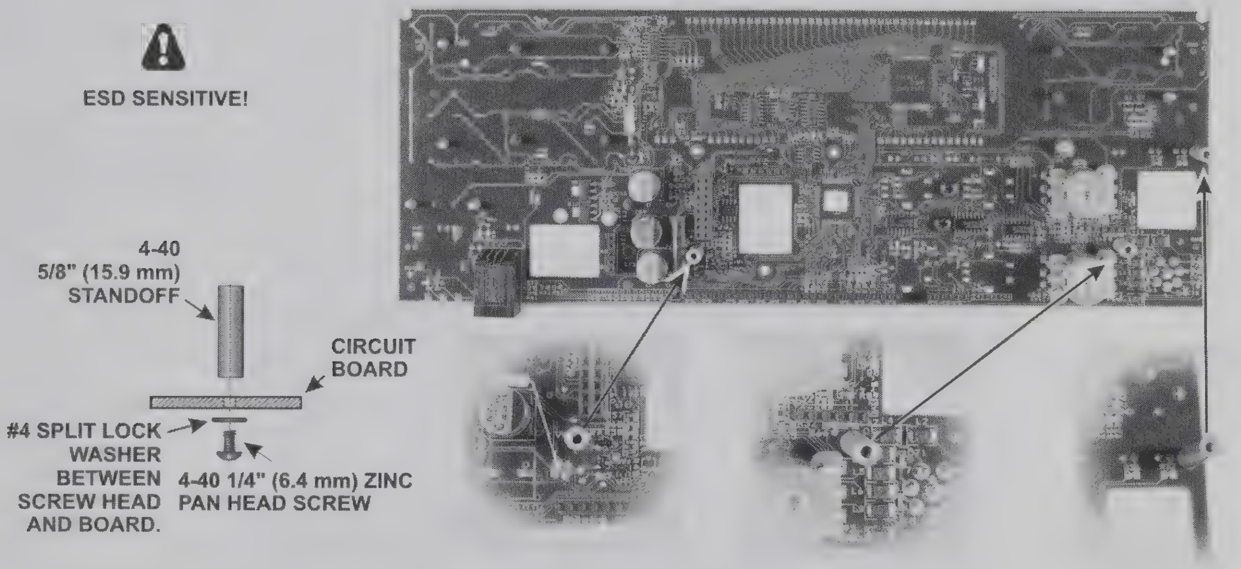


Figure 36. Preparing the Front Panel Board for Mounting, Part 1.

☐ On the front side of the board, mount four standoffs as shown in Figure 37.

⚠ IMPORTANT!

1. **Place the split lock washers between the standoff and board as shown in the figure. This is important to establish the correct spacing between the board and the front panel.**
2. **Note that the two standoffs near the LCD use smaller #2 hardware.**

⚠ ESD SENSITIVE!

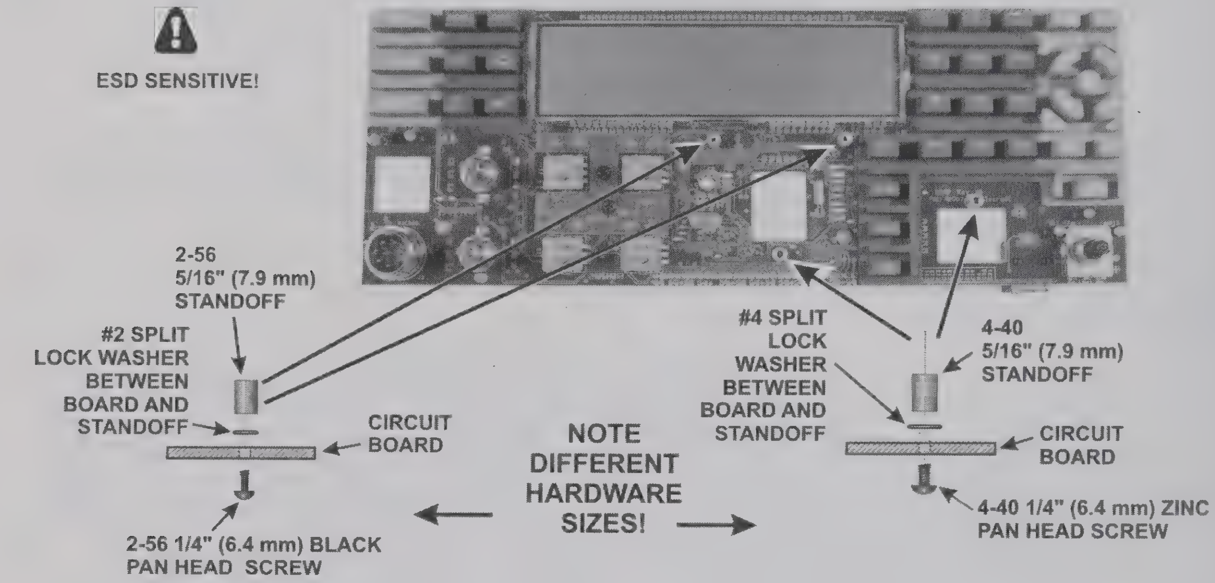

2-56
5/16" (7.9 mm)
STANDOFF
#2 SPLIT LOCK WASHER BETWEEN BOARD AND STANDOFF
CIRCUIT BOARD
2-56 1/4" (6.4 mm) BLACK PAN HEAD SCREW
NOTE DIFFERENT HARDWARE SIZES!
#4 SPLIT LOCK WASHER BETWEEN BOARD AND STANDOFF
4-40
5/16" (7.9 mm)
STANDOFF
CIRCUIT BOARD
4-40 1/4" (6.4 mm) ZINC PAN HEAD SCREW

Figure 37. Preparing the Front Panel Board for Mounting, Part 2.

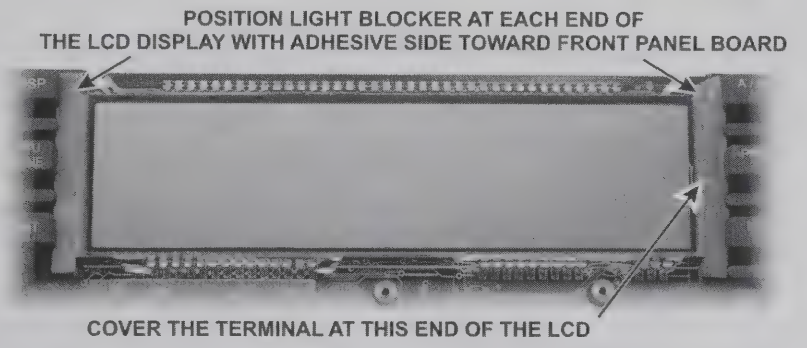
☐ Inspect the front panel board to verify the following:

Three 4-40 5/8” (15.9 mm) standoffs are mounted on the back as shown in Figure 36.

Two 4-40 5/16” (7.9 mm) standoffs are mounted on the front as shown in Figure 37.

Two 2-56 5/16” (7.9 mm) standoffs are mounted on the front as shown in Figure 37.

☐ Install the two soft foam light blockers at the ends of the LCD display as shown in Figure 38. Remove the paper strip covering the adhesive on each blocker and stick that side against the board (or the lip at the base of the switch buttons) so it stands up between the switches and the LCD. Push them down so the adhesive side is against the board or base of the switches and that they cover ends of the LCD, including the terminals at the right hand end of the LCD as shown.

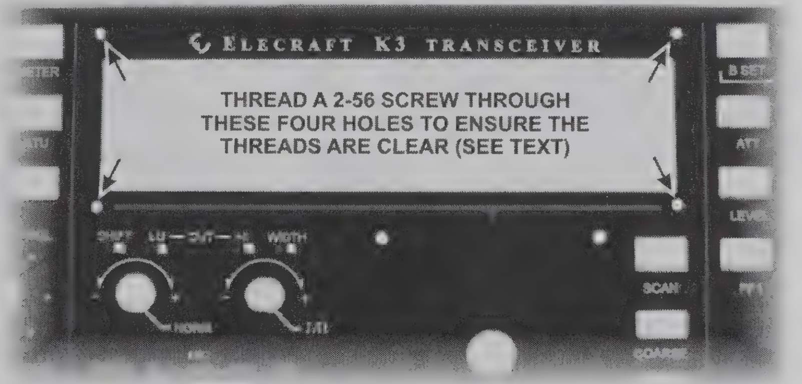

POSITION LIGHT BLOCKER AT EACH END OF THE LCD DISPLAY WITH ADHESIVE SIDE TOWARD FRONT PANEL BOARD

COVER THE TERMINAL AT THIS END OF THE LCD

Figure 38. Installing LCD Light Blocker.

☐ Locate the front panel and inspect the inside surface for any masking tape covering the holes left during the painting process. If any is found peel it off.

☐ Locate a 2-56 5/32" (4.0 mm) black pan head screw found in the small envelope marked E850340 LCD Bezel Screws Envelope 2-56 5/32 Blk Ox PH+(700149). Thread the screw through each of the four threaded holes at the corners of the opening in the front panel for the LCD to ensure they are clear of paint (see Figure 39). Lubricate the screw if the fit is tight. A drop of water on the threads will usually work well and it is easier to wipe away excess water than oil. Return the screw to the envelope until it is called for later.



THREAD A 2-56 SCREW THROUGH THESE FOUR HOLES TO ENSURE THE THREADS ARE CLEAR (SEE TEXT)

Figure 39. Checking 2-56 Threaded Screw Holes.

☐ Place the front panel board face up on your work surface, then set the front panel over it as shown in Figure 40. Check to ensure the LEDs above the four controls under the LCD display, the red and yellow LEDs below the POWER button, and the three LEDs above the control in the lower right corner of the panel are positioned in their openings. If necessary, lift the panel off and gently adjust the position of the LEDs.

☐ Ensure the flange on the MIC connector is not caught behind the panel. The flange should be slightly above the panel as shown all the way around its circumference as shown in Figure 40. It may be a snug fit requiring you to press it into place, pushing on the back of the connector. If the connector refuses to fit through the hole in the front panel, use a sharp tool to carefully remove the paint from the inside edge where the connector is binding against the hole. Work from the ***inside*** of the front panel to avoid damaging the paint on the front edge of the MIC connector hole.

☐ Secure the front panel to the board with a 4-40 3/16" (4.8 mm) black flat head screw (SS) above the control opening near the right end and a 1/2" (13mm) nut and inside tooth lock washer on each concentric pot bushing near the left end as shown. Tighten the screw and nuts only until you feel firm resistance. Be very careful not to scratch the front panel.

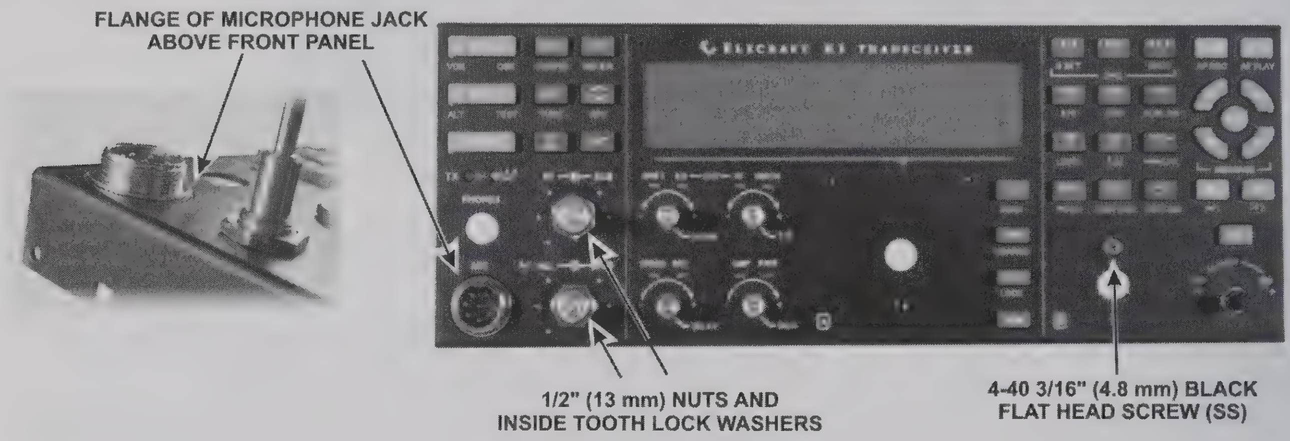

FLANGE OF MICROPHONE JACK
ABOVE FRONT PANEL
1/2" (13 mm) NUTS AND
INSIDE TOOTH LOCK WASHERS
4-40 3/16" (4.8 mm) BLACK
FLAT HEAD SCREW (SS)

Figure 40. Mounting the Front Panel on the Front Panel Board.

☐ Two identical encoder assemblies are provided for VFO A and VFO B. Select one encoder and place a 1/2" (13mm) inside tooth lock washer over the threaded shaft as shown in Figure 41. This will be the VFO A encoder.

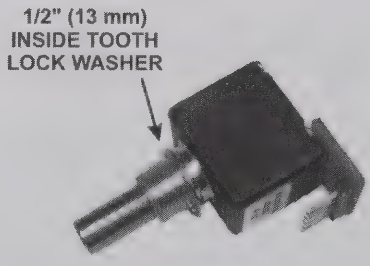


Figure 41. VFO A Encoder Assembly Preparation for Installation.

☐ Place the VFO A encoder in the opening near the center of the front panel board so the shaft protrudes through the opening under the LCD. Be careful to avoid dropping the lock washer into to the space between the front panel board and the front panel. Normally, the lock washer hangs on the threads while you put the encoder in place. Optionally, you can hold the encoder with the shaft upright and place the front-panel assembly over it until the shaft is through the hole. Orient the encoder so the pins mate with connector J33 on the front panel board as shown in Figure 42.

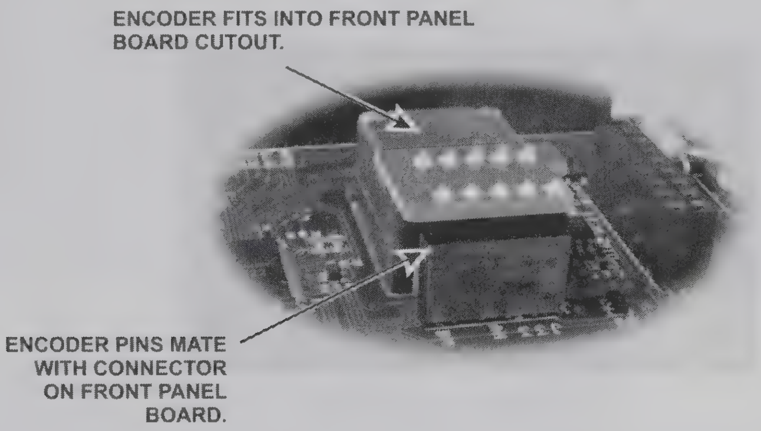

ENCODER FITS INTO FRONT PANEL BOARD CUTOUT.
ENCODER PINS MATE WITH CONNECTOR ON FRONT PANEL BOARD.

Figure 42. Mounting VFO Encoders.

☐ Place a 1/2" (13mm) inside tooth lock washer and nut on the threaded shaft of the VFO A encoder and tighten them against the front panel. Take care not to damage the front panel paint with your tools.

☐ Prepare the remaining encoder for VFO B as shown in Figure 43. Be sure the nut is tight against the shoulder of the ferrule. Cut only the five pins shown close to the back of the pc board so they do not extend above the solder pads. Cutting them avoids the possibility of a short circuit to an adjacent pc board when the K3 is assembled.

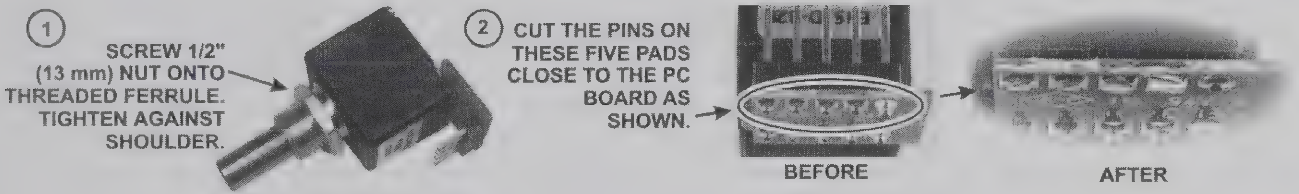

①
SCREW 1/2" (13 mm) NUT ONTO THREADED FERRULE. TIGHTEN AGAINST SHOULDER.
②
CUT THE PINS ON THESE FIVE PADS CLOSE TO THE PC BOARD AS SHOWN.
BEFORE
AFTER

Figure 43. VFO B Encoder Assembly Preparation for Installation.

☐ Place the VFO B encoder in the opening near the end of the front panel board so the nut rests against the inside of the front panel and the encoder pins mate with J34. The connectors may not mate fully, leaving a very small area of the pins showing. That is normal.

☐ Place a 1/2" (13mm) inside tooth lock washer and nut on the threaded shaft of the VFO B encoder and tighten them against the front panel. Take care not to damage the front panel paint with your tools.

☐ Place a second 1/2" (13mm) nut on the VFO A encoder shaft under the LCD and tighten it against the nut you installed earlier (see Figure 44).

☐ Locate the clear plastic LCD display cover and VFO A trim panel. They may have an adhesive paper covering them for protection. If so remove it. If needed, wash the them in warm water with mild soap. To avoid etching or scratching the surface, do not use harsh detergents or wipe them with paper towels.

CAUTION!

In the following steps you will attach the plastic LCD cover and VFO A trim panels to the front cover using small screws. Use the screws specified in each step. Do not over-tighten these screws. Tighten the screws only to the point where you feel some resistance. It is very easy to strip the threads, especially the screws holding the LCD cover. If you strip these threads the only remedy is to obtain a new front panel!

☐ Brush or blow any dust or lint away from the front panel area around the encoder shaft under the LCD, then mount the trim panel as shown in Figure 44, oriented so the beveled edges are away from the front panel. Use the 2-56 1/4" screws and the 4-40 5/16" screw found in the small envelope marked E850241 VFO A Bezel Screws Envelope. Tighten the screws only until they come into firm contact with the trim panel. (If you had already opened the envelope, be sure you are using the 1/4" (6.4 mm) screws and not the shorter 5/32" (4.0 mm) screws.) ***Be careful not to over-tighten the screws or you may strip the threads or break the trim panel!***

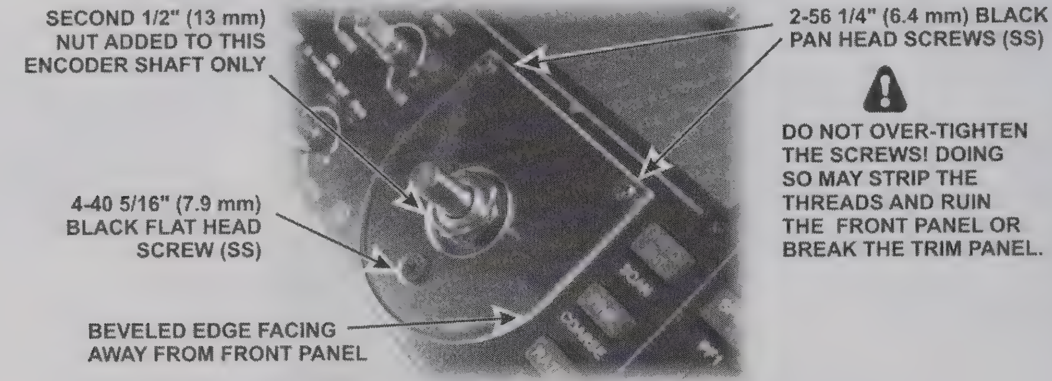

SECOND 1/2" (13 mm) NUT ADDED TO THIS ENCODER SHAFT ONLY
2-56 1/4" (6.4 mm) BLACK PAN HEAD SCREWS (SS)
DO NOT OVER-TIGHTEN THE SCREWS! DOING SO MAY STRIP THE THREADS AND RUIN THE FRONT PANEL OR BREAK THE TRIM PANEL.
4-40 5/16" (7.9 mm) BLACK FLAT HEAD SCREW (SS)
BEVELED EDGE FACING AWAY FROM FRONT PANEL

Figure 44. Mounting VFO A Trim Panel.

☐ Locate the clear plastic LCD cover and four 2-56 5/32" (4.0 mm) black pan head screws. These screws are in the small envelope marked E850340 LCD Bezel Screws Envelope 2-56 5/32 Blk Ox PH+(700149) or (SS). ***Be sure you are using 5/32" (4.0 mm) screws to install the cover in the following steps. Longer screws may extend through the front panel and break the glass front of the LCD!***

☐ Check the LCD cover screw holes by sliding a 2/56 screw through them to be sure they are clear of any bits of plastic that might interfere with the screws. The screws should side easily through the holes. Pushing them back and forth through the holes should loosen the fit if they are tight. When finished, ensure the LCD cover is free of dust, smudges and fingerprints.

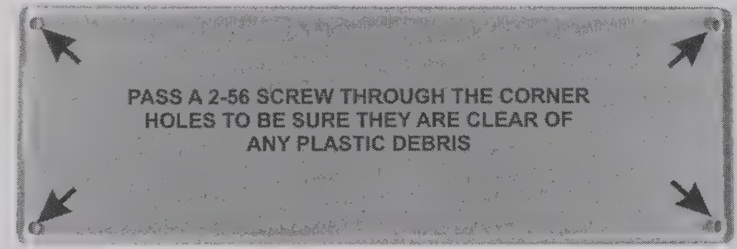
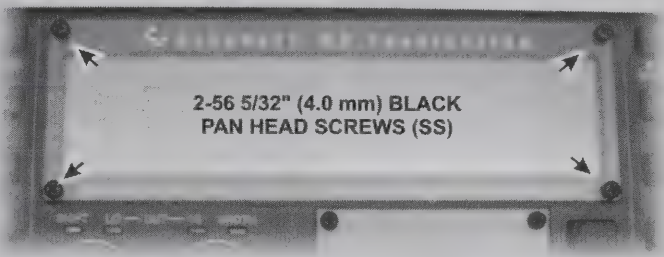

PASS A 2-56 SCREW THROUGH THE CORNER HOLES TO BE SURE THEY ARE CLEAR OF ANY PLASTIC DEBRIS

Figure 45. Checking LCD Cover Screw Holes.

☐ Mount the cover on the front panel over the LCD as shown in Figure 46 oriented so the beveled edges are away from the panel. If the cover seems to bind against the VFO A trim panel, rotate it so the long edge striking the trim panel is at the top and, if necessary, work the screws through the holes in the plastic cover some more to loosen the fit. Tighten the screws only until they come into firm contact with the trim panel. ***Be sure you are using screws no longer than 5/32" (4.0 mm) (SS), and do not thread the screws through the front panel without the cover in place to avoid the screws breaking the glass front of the LCD.***

DO NOT OVER-TIGHTEN THE SCREWS! DOING SO MAY STRIP THE THREADS AND RUIN THE FRONT PANEL OR BREAK THE LCD COVER.



2-56 5/32" (4.0 mm) BLACK PAN HEAD SCREWS (SS)

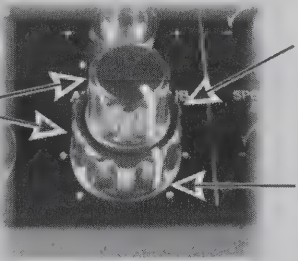
Figure 46. Installing LCD Cover.

☐ Place the larger of a pair of concentric knobs over the RF/SQL - SUB control as follows (See Figure 47):

CAUTION!

Do not over-tighten the set screws in the knobs in the following steps or you may crack the knobs! Use only enough torque to hold the knobs in place.

- Turn both shafts fully clockwise
- Place the larger knob over the shafts. Do not tighten the set screw yet.
- Place the smaller knob over the shaft, align its index line as shown in Figure 47 and tighten one set screw with a 0.050" Allen wrench.
- Rotate the larger knob so its index line is aligned with the index mark in the smaller knob, then lift it gently so it does not bind against the control bushing or the upper knob and tighten one set screw.
- Rotate both knobs about half way counter-clockwise and tighten the second set screw in each knob.
- Rotate the smaller and larger knobs over their entire range to see if moving one knob moves the other at any point in the rotation. If it does, loosen the set screws on the larger knob and move it slightly toward the panel until the knobs operate independently over their entire range of movement.



TIGHTEN TWO SET SCREWS IN EACH KNOB

POSITION LARGER KNOB SO IT DOES NOT BIND AGAINST FRONT PANEL OR UPPER KNOB.

WHEN POSITIONED AT EITHER STOP THE INDEX MARKS WILL BE JUST PAST THE LAST PANEL MARKING.

Figure 47. Mounting Concentric Knobs.

☐ Place a pair of concentric knobs over the AF-SUB controls in the same manner as you installed the RF/SQL-SUB knobs. Don't forget to start by turning both shafts fully clockwise.

⚠ *CAUTION!*

You may damage the encoders while installing the knobs in the next step unless you align the flats in the knobs with the flats on the shafts as described below.

☐ Press small knobs on the four controls under the left end of the LCD: SHIFT/LOW, HI/WIDTH, SPEED/MIC and CMP/PWR. These knobs are all the same size and are held in place by a friction spring as shown in Figure 48. Align the flat in the knob with the flat on each shaft before pressing each knob in place. In addition to the rotating encoder, each knob has a switch that is actuated by pressing the knob toward the panel. You will feel the switch action when you press each knob onto the shaft.

> ⚠ **If a knob feels very loose, check to see if the metal friction spring insert is in place as shown below. If not it should be in the bag with the knobs. Slide the spring insert into the knob and place it on the shaft. Friction will hold it and the knob securely once it is mounted.**

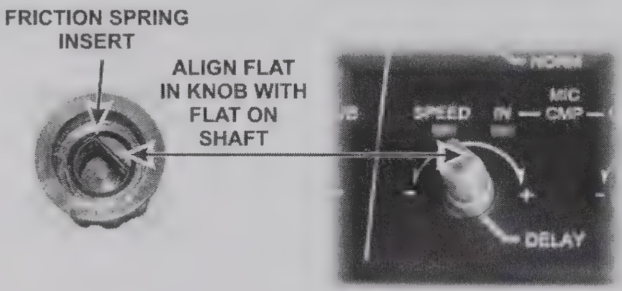


Figure 48. Mounting Friction Knobs.

☐ In the same manner, mount the slightly larger friction knob onto the RIT/XIT control in the lower right corner of the front panel. The RIT/XIT control does not have the switch action of the other four encoders.

☐ Mount the large knob on the VFO A encoder shaft below the LCD as shown in Figure 49. Adjust the position of the knob against the felt washer to produce the desired amount of drag for smooth movement without the knob turning too freely. Setting the panel face up and then placing the knob on the shaft so its weight determines the pressure against the felt usually produces a satisfactory amount of friction. If you want to make further adjustment and find it too sensitive, try a second felt washer under the knob. An extra felt washer is included in the kit for this purpose. You can do this after assembly is completed. The finger grip slides off to provide access to the set screw.

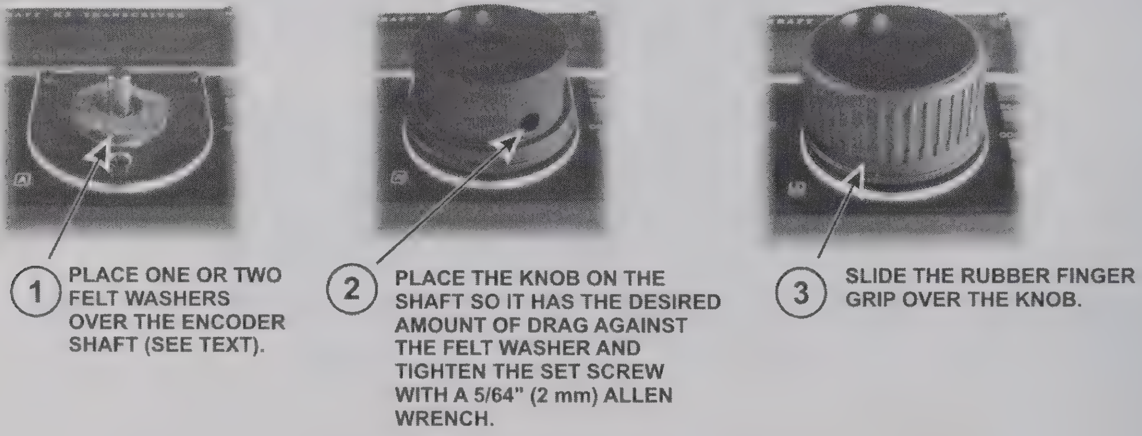
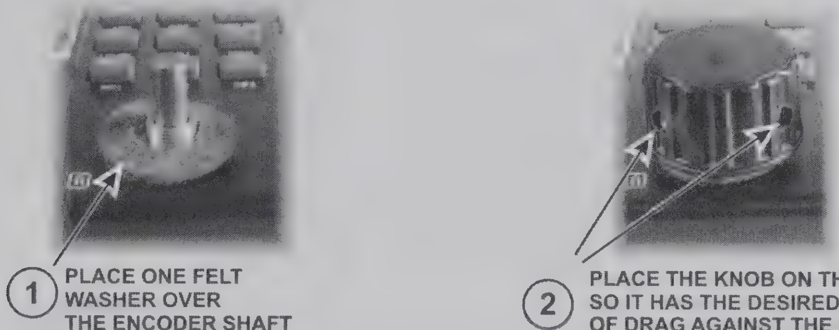

① PLACE ONE OR TWO FELT WASHERS OVER THE ENCODER SHAFT (SEE TEXT).
② PLACE THE KNOB ON THE SHAFT SO IT HAS THE DESIRED AMOUNT OF DRAG AGAINST THE FELT WASHER AND TIGHTEN THE SET SCREW WITH A 5/64" (2 mm) ALLEN WRENCH.
③ SLIDE THE RUBBER FINGER GRIP OVER THE KNOB.

Figure 49. Mounting the VFO A Tuning Knob.

☐ Mount the last knob on the VFO B encoder shaft to the right (under the pushbutton switches) as shown in Figure 50. Before tightening both set screws, adjust the position of the knob against the felt washer to produce the desired amount of drag for smooth movement without the knob turning too freely.



① PLACE ONE FELT WASHER OVER THE ENCODER SHAFT SO THE NUT SHOWS THROUGH THE CENTER.

② PLACE THE KNOB ON THE SHAFT SO IT HAS THE DESIRED AMOUNT OF DRAG AGAINST THE FELT WASHER AND TIGHTEN BOTH SET SCREWS WITH A 5/64" (2 mm) ALLEN WRENCH.

Figure 50. Mounting the VFO B Knob.

Mounting the Subreceiver Auxiliary DSP Board

If you purchased the optional KRX3 Subreceiver with your K3, install the KXR3 auxiliary DSP board as follows. If you did not purchase the KRX3, go to *Installing the KDVR3 Digital Voice Recorder Option* on page 38 if you purchased the KDVR3 Digital Voice Recorder Option with your K3. If you do not have the KDVR3, go directly to *Mounting the DSP Board Assembly on the Front Panel* on page 39.

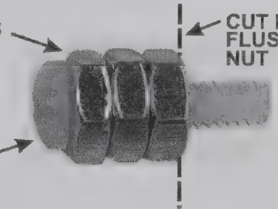
The parts called for in the following procedure are included in the KRX3 Subreceiver kit. Install only the Auxiliary DSP board as described in the following steps. You will complete the KRX3 installation after the basic K3 is assembled, calibrated and tested.

☐ If your KRX3 kit was supplied with 1/4" (6.4mm) long nylon screws, skip this step. If you have 1/2" (13mm) nylon screws, cut all three of them to length as follows:

Screw three 4-40 nuts onto the 1/2" (13 mm) 4-40 nylon screw as shown in Figure 51.

Cut off the nylon screw flush with the last nut. Sharp diagonal cutters or a knife will cut the nylon.

After cutting, remove all three nuts. (The nuts establish the correct length for the screw and "clean up" the thread where you cut the screw.)



THREE 4-40 NUTS

CUT NYLON SCREW FLUSH WITH LAST NUT

4-40 1/2" (13 mm) NYLON SCREW

Figure 51. Preparing the Nylon Screw.

☐ Mount the three 7/16" (11mm) male/female standoffs on the component side of the ***main*** DSP board as shown in Figure 52 using 4-40 nuts and #4 split lock washers. Be sure that:

_ The standoffs are on the component side of the board as shown.

No lock washer is used between the standoff and the board.

_ One split lock washer is used between the nut and the board.

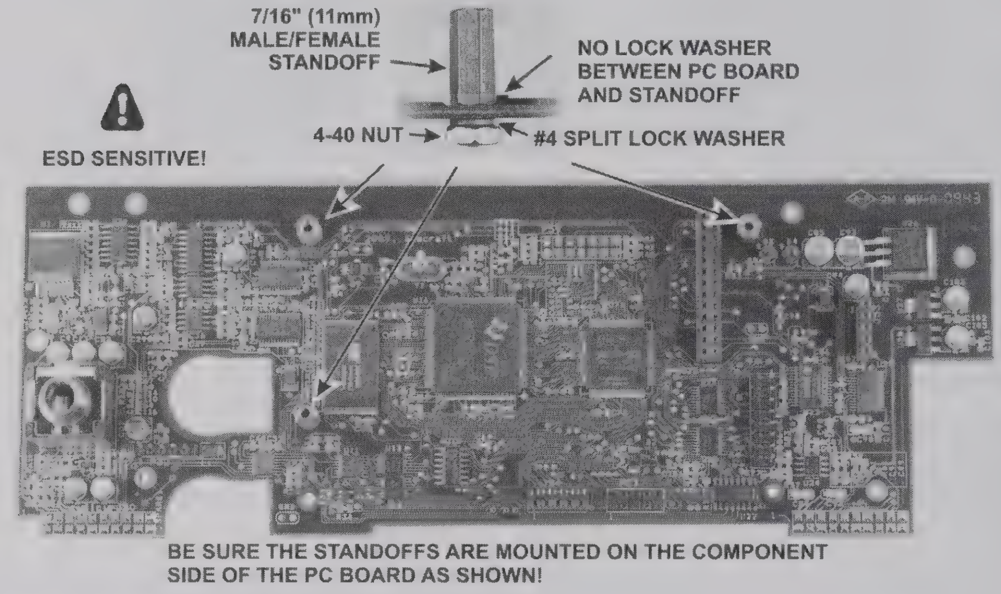

7/16" (11mm) MALE/FEMALE STANDOFF
NO LOCK WASHER BETWEEN PC BOARD AND STANDOFF
ESD SENSITIVE!
4-40 NUT
#4 SPLIT LOCK WASHER
BE SURE THE STANDOFFS ARE MOUNTED ON THE COMPONENT SIDE OF THE PC BOARD AS SHOWN!

Figure 52. Installing Standoffs on the Main DSP Board.

☐ Plug the aux DSP board into the main DSP board by mating P52 and P53 on the aux DSP board (at the narrow end) with J52 and J53 on the main DSP board. When fully seated, the connectors should be fully engaged so that the pins do not show and the aux DSP board should rest against the top of the standoffs with the holes in the board aligned for the screws (See Figure 53). Note that a two-row 10-pin connector at the top of the aux DSP board does not mate with anything on the main DSP board. That is normal. Attach the boards with three 4-40 1/4" (6.4 mm) ***nylon*** screws or the nylon screws you trimmed to length earlier (see Figure 51). Place a split lock washer under each screw head. Do not place washers between the standoff and the pc board. ***Be careful tightening the nylon screws. They are easily stripped!***

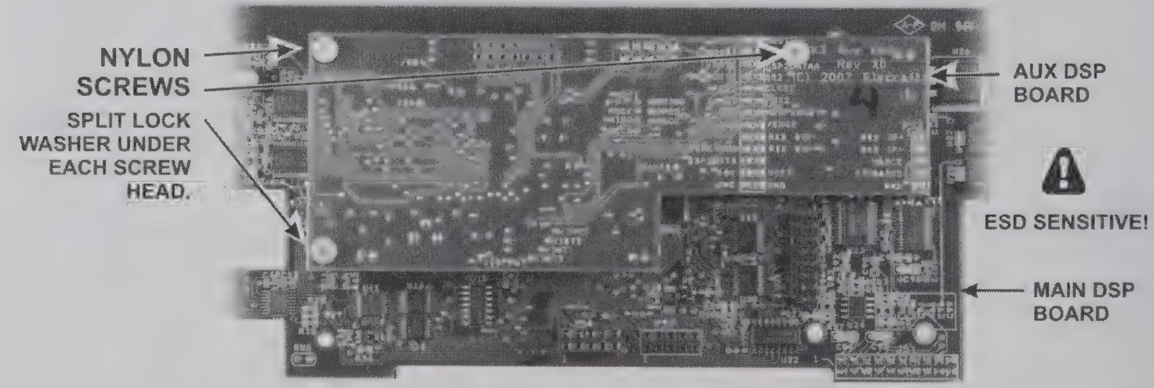


Figure 53. Mating the Main and Auxiliary DSP Boards.

☐ Locate resistor R3 on the front panel board (mounted on the front panel). If R3 is positioned above the board on its leads as shown in Figure 54, push it over to one side of the outline as shown. Be sure you don't push it so far its leads might touch the solder pads for other components on the board.

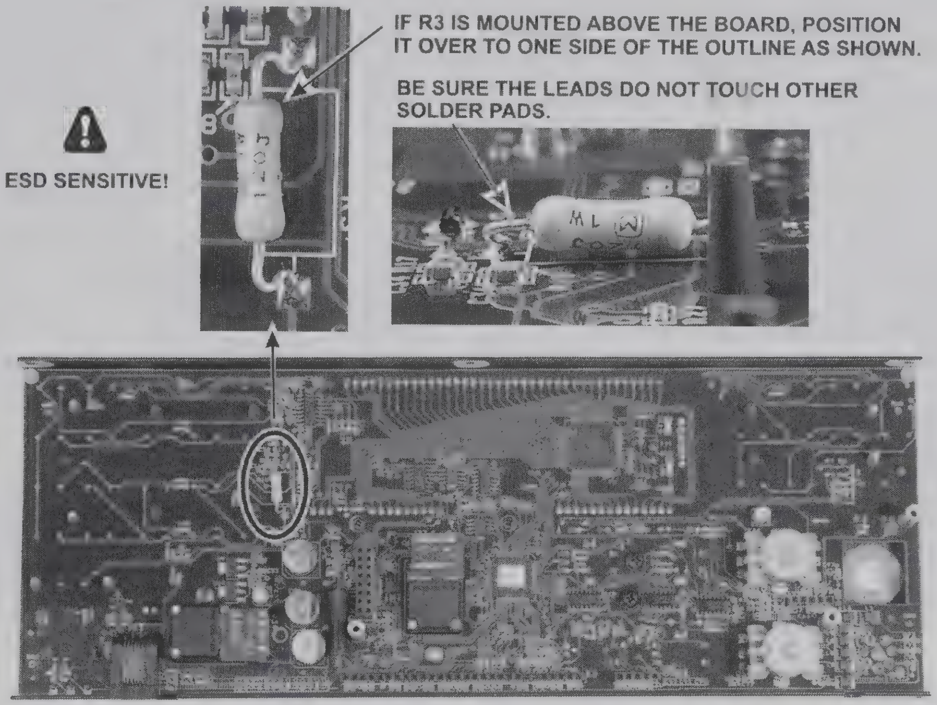

IF R3 IS MOUNTED ABOVE THE BOARD, POSITION IT OVER TO ONE SIDE OF THE OUTLINE AS SHOWN.
BE SURE THE LEADS DO NOT TOUCH OTHER SOLDER PADS.
ESD SENSITIVE!

Figure 54. Positioning R3 on the Front Panel Board.

Installing the KDVR3 Digital Voice Recorder Option

☐ If you have the KDVR3, install it on the main DSP board as shown in Figure 55. The required hardware is included in your KDVR3 kit. If you did not purchase the KDVR3, skip this step and continue with *Mounting the DSP Board Assembly on the Front Panel* on 39.

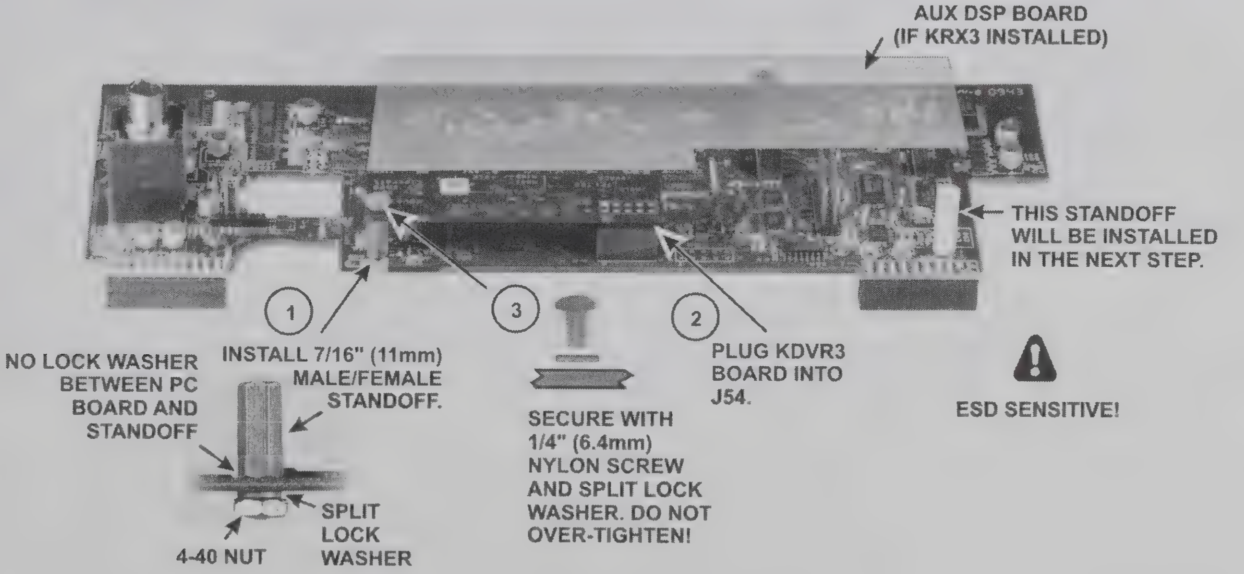

AUX DSP BOARD (IF KRX3 INSTALLED)
THIS STANDOFF WILL BE INSTALLED IN THE NEXT STEP.
①
INSTALL 7/16" (11mm) MALE/FEMALE STANDOFF.
NO LOCK WASHER BETWEEN PC BOARD AND STANDOFF
SPLIT LOCK WASHER
4-40 NUT
③
SECURE WITH 1/4" (6.4mm) NYLON SCREW AND SPLIT LOCK WASHER. DO NOT OVER-TIGHTEN!
②
PLUG KDVR3 BOARD INTO J54.
ESD SENSITIVE!

Figure 55. Installing the KDVR3 Board.

Mounting the DSP Board Assembly on the Front Panel

☐ Locate the main DSP board and install the nylon standoff near J51 as shown below. Be sure you place it in the correct hole near the edge of the board. The standoff is also shown in Figure 55.

> ⚠ **CAUTION: To avoid damaging a circuit trace very close to the metal ring around the screw hole, position the lock washer under the screw so the split faces away from the trace. Tighten the hardware by turning the standoff while holding the screw and lock washer stationary.** ***Do not over-tighten the screw. It is easy to strip the threads in the nylon standoff.***

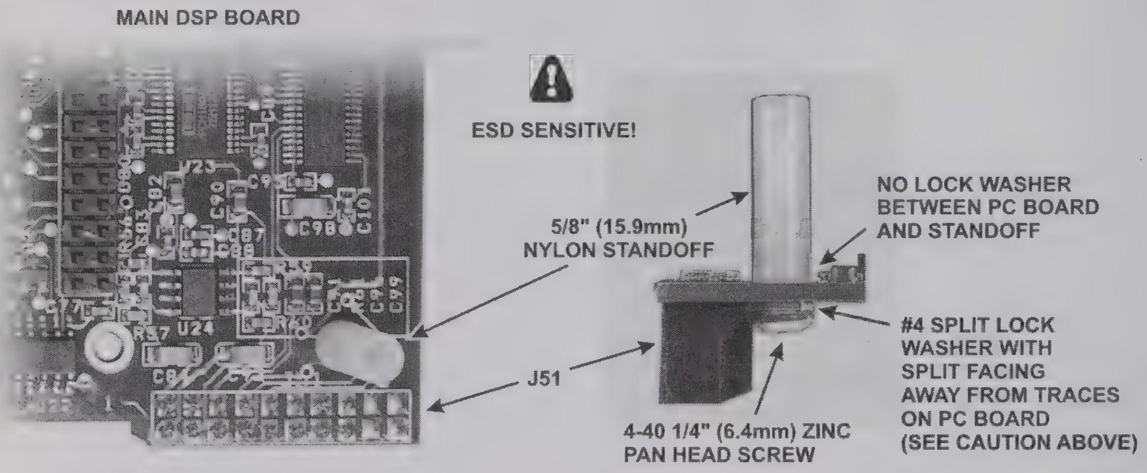

MAIN DSP BOARD
ESD SENSITIVE!
5/8" (15.9mm) NYLON STANDOFF
NO LOCK WASHER BETWEEN PC BOARD AND STANDOFF
J51
#4 SPLIT LOCK WASHER WITH SPLIT FACING AWAY FROM TRACES ON PC BOARD (SEE CAUTION ABOVE)
4-40 1/4" (6.4mm) ZINC PAN HEAD SCREW

Figure 56. Installing the Nylon Standoff.

☐ Place the front panel assembly face down on a soft, clean surface to protect the finish. The back side of the front panel board should be facing upward.

☐ Position the large flat washer on the inside of the front panel over the PHONES jack hole (see Figure 59 on page 41). This is easily done by sliding the washer into place from the end of the front panel.

☐ Gently position the DSP board on the front panel board so that the large jack fits through the cutout in the front panel board with the threaded section passing through the large flat washer and the circular opening in the front panel. Adjust the position of the board as needed so you can see the standoffs on the front panel board lined up with the screw holes in the DSP board.

☐ Pick up the assembly while holding the DSP board in place and inspect the position of the two male plugs on the DSP board. They should mate with J31 and J32 on the front panel board. J31 is near the encoder for VFO A and J32 is between the two dual potentiometers. Adjust the DSP board's position as needed so the pins enter the corresponding holes in the sockets on the front panel board.

> ⚠ **Use a strong light to look between the boards to be sure the connectors are properly mated. Be especially careful to check the connector near the dual potentiometers. Be sure the pins are entering the socket and not resting alongside it.**

☐ Squeeze the boards together while ensuring the pins are mating with the connectors until the DSP board is resting against the three standoffs on the back of the front panel board that you installed earlier. The two connectors will not mate completely. About 1/4" (6.4mm) of the pins may be visible when the DSP board is positioned against the standoffs. There are other connectors on the DSP board as well, but the two that mate with J31 and J32 are the only ones that connect between the front panel and DSP boards.

☐ If you installed the Auxiliary DSP board for the KRX3 and adjusted the position of resistor R3 as shown in Figure 54, look between the DSP boards and the front panel board to verify that the leads are not touching any terminals on either the aux DSP or front panel boards (see Figure 57). If necessary, unplug the DSP board assembly and adjust the position of R3 to ensure the leads are clear of other solder pads before proceeding.

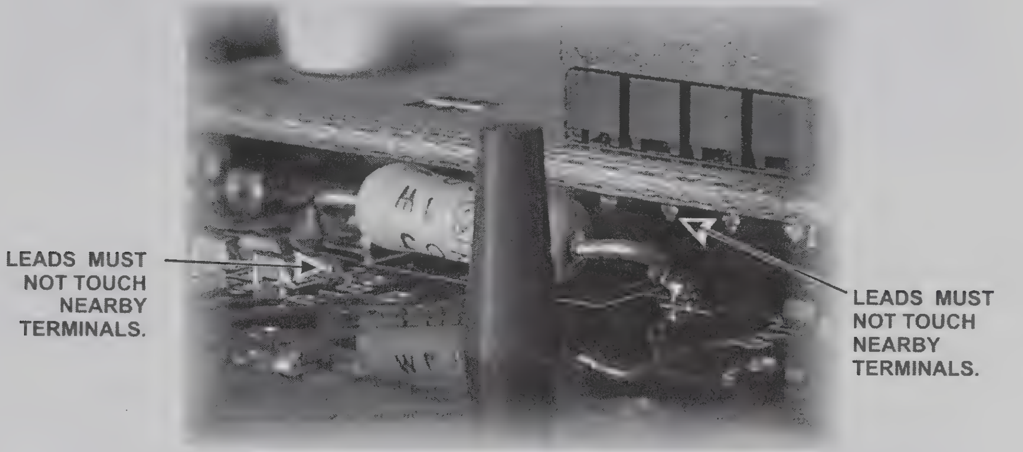

LEADS MUST NOT TOUCH NEARBY TERMINALS.
LEADS MUST NOT TOUCH NEARBY TERMINALS.

Figure 57. Checking the Position of R3.

☐ Secure the DSP board to the front panel board with three 4-40 1/4" (6.2 mm) zinc pan head screws and split lock washers as shown in Figure 58.

ESD SENSITIVE!

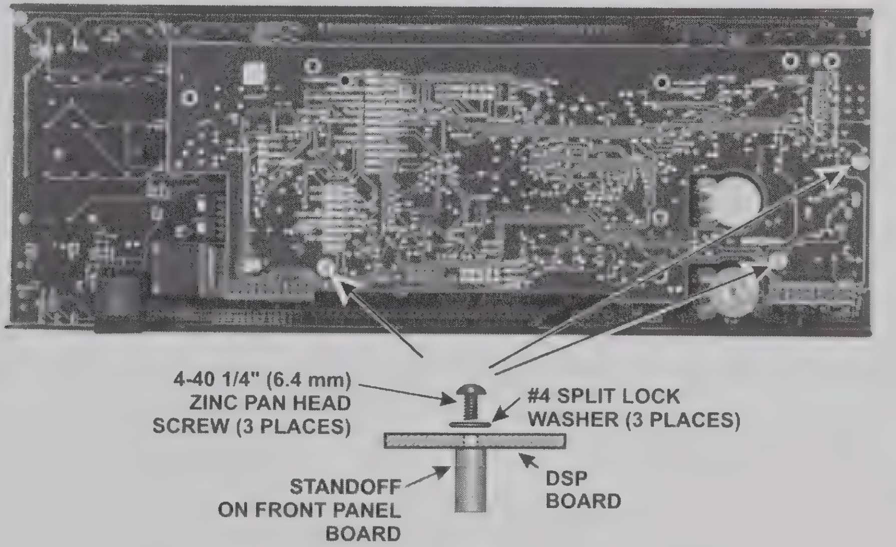

4-40 1/4" (6.4 mm) ZINC PAN HEAD SCREW (3 PLACES)
#4 SPLIT LOCK WASHER (3 PLACES)
STANDOFF ON FRONT PANEL BOARD
DSP BOARD

Figure 58. Mounting the DSP Board.

☐ Screw the knurled nut onto the threaded shaft of the PHONES jack where it exits the front panel (see Figure 59). Screw it only finger tight. Do not use pliers.

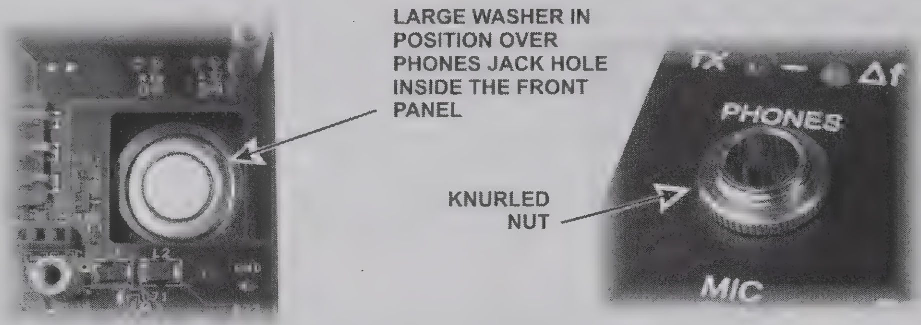

LARGE WASHER IN POSITION OVER PHONES JACK HOLE INSIDE THE FRONT PANEL
KNURLED NUT
TX
Δf
PHONES
MIC

Figure 59. Phones Jack Hardware.

Mounting the Front Panel Assembly

☐ Remove both side panels from the chassis as follows. This will allow you to see the connectors that must mate properly when attaching the front panel assembly.

_ Remove the two screws shown in Figure 60 so the 2D connector and standoff remain attached to the side panel. Remove the remaining screws in the right side panel to free it.

_ Remove all of the screws in the left side panel (except the two screws holding the handle assembly) to free it.

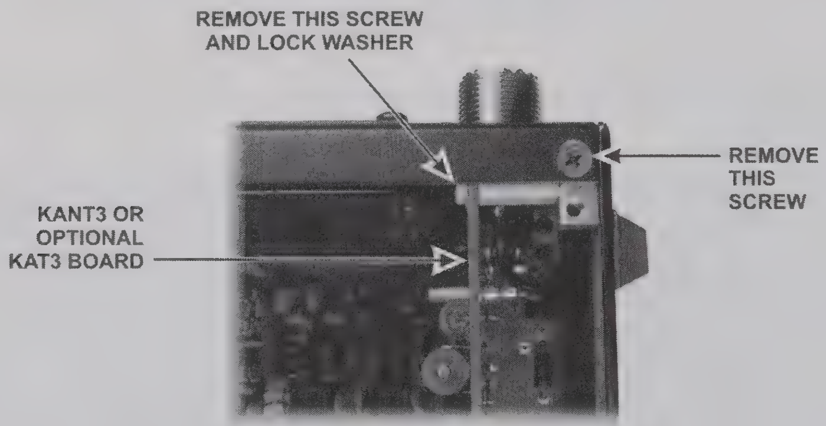

REMOVE THIS SCREW AND LOCK WASHER
REMOVE THIS SCREW
KANT3 OR OPTIONAL KAT3 BOARD

Figure 60. Removing Right Side Panel Hardware.

⚠ ESD SENSITIVE: Wear a grounded wrist strap or touch an unpainted metal ground before handling the RF Board in the following steps.

☐ Turn the chassis upside down and position the front panel so the pins of P30 and P35 on the bottom of the RF board just begin to engage the connectors on the lower edge of the front panel assembly. Do not fully mate them yet.

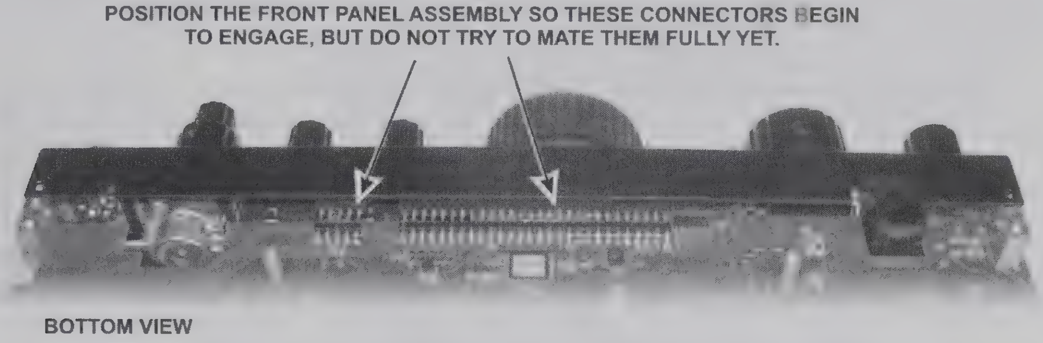

POSITION THE FRONT PANEL ASSEMBLY SO THESE CONNECTORS BEGIN TO ENGAGE, BUT DO NOT TRY TO MATE THEM FULLY YET.
BOTTOM VIEW

Figure 61. Mounting Front Panel Assembly - Connectors P30 and P35.

☐ Look at the two multi-pin connectors on the top of the RF board to see if they are engaging the corresponding connectors on the front panel assembly (see Figure 62). Adjust the position of the RF board or the front panel assembly to ensure they are mating properly.

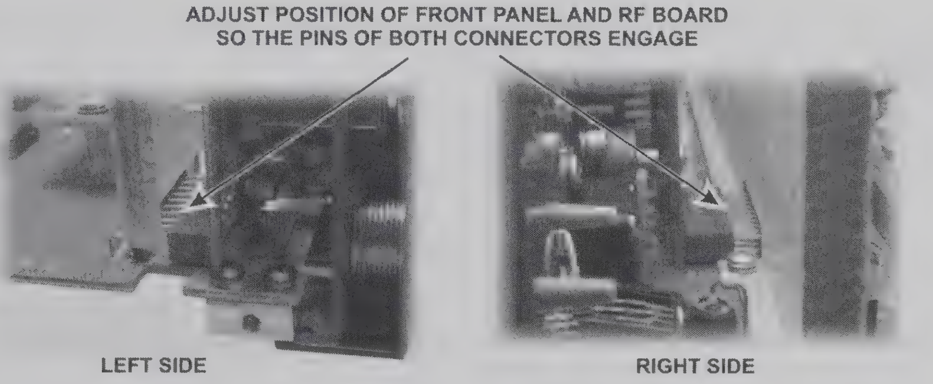
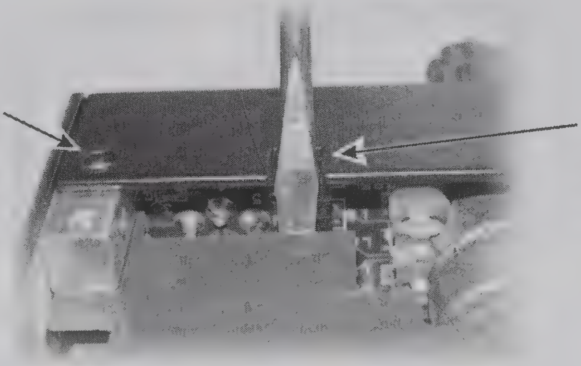

ADJUST POSITION OF FRONT PANEL AND RF BOARD SO THE PINS OF BOTH CONNECTORS ENGAGE
LEFT SIDE
RIGHT SIDE

Figure 62. Mounting Front Panel Assembly - Connectors P50 and P51.

☐ With the pins of all four connectors started, press the front panel onto the RF board connectors. Press only from the bottom of the front panel to avoid flexing the RF board. You can use your fingers to press on the back side of each multi-pin connector on the top of the RF board while holding the front panel to engage them. There may be small areas of pins showing even after they are mated. You will know they are properly mated when the screw holes on the bottom lip of the front panel assembly line up with the screw holes in the 2D fasteners on the bottom of the RF board.

⚠ REMOVING THE FRONT PANEL: If you need to remove the front panel assembly, remove the five screws holding it to the chassis (three on the top lip and two on the bottom), turn the unit upside down and use a screwdriver in the two pry slots provided as shown in Figure 63. Do not insert the screwdriver deep enough to strike components on the boards! Pry each end in short increments until the connectors separate. Either a blade (as shown) or Phillips screwdriver may be used. Note that you may need to remove the left side panel and the 2D mounting screw shown in Figure 62.



REMOVE THE FIVE SCREWS HOLDING THE FRONT PANEL ASSEMBLY (ONE AT EACH CORNER AND ONE AT THE CENTER OF THE UPPER LIP)

PLACE A SCREWDRIVER IN THE NOTCH PROVIDED AT EACH END OF THE FRONT PANEL SO IT PRESSES AGAINST THE EDGE OF THE RF BOARD TO PRY THE FRONT PANEL ASSEMBLY LOOSE

Figure 63. Removing the Front Panel.

☐ Secure the front panel assembly at the bottom lip to the 2D fasteners at the forward edge of the RF board with two 4-40 3/16" (4.8 mm) black pan head screws (SS).

☐ Replace the right side panel (the panel with the feet) as follows:

- Start four 4-40 3/16" (4.8 mm) black flat head screws (SS) through the side panel: three along the bottom and one at the front top. Make the threads have engaged, but do not tighten them yet.
- Start one 4-40 3/16" (4.8 mm) black flat head screw (SS) through the rear panel into the 2D fastener shown in Figure 60.
- Start one 4-40 3/16" (4.8 mm) black flat head screw (SS) at the top right corner of the front panel assembly, nearest the side panel.
- Tighten all six screws
- Replace the 4-40 1/4" (6.4mm) zinc pan head screw holding the KANT3 (or KAT3) board shown in Figure 60.

☐ Attach voltage regulators U13 and U12 to the right side panel as shown in Figure 64 using a 4-40 3/8" (9.5 mm) black flat head screw (SS), #4 inside tooth lock washer and a #4 nut for each regulator as shown. When the screws are tightened the tabs on U12 and U13 should lie flat against the side panel.

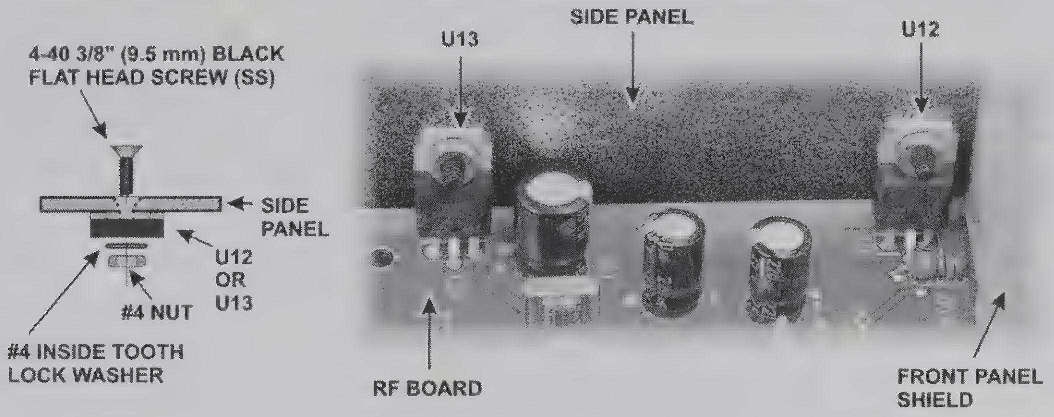

4-40 3/8" (9.5 mm) BLACK FLAT HEAD SCREW (SS)
SIDE PANEL
U12 OR U13
#4 NUT
#4 INSIDE TOOTH LOCK WASHER
U13
SIDE PANEL
U12
RF BOARD
FRONT PANEL SHIELD

Figure 64. Attaching U12 and U13 to the Right Side Panel.

☐ If you are installing the K3EXREF option, refer to the *K3 K3EXREF Frequency Lock Option* manual and install the coaxial cable as shown in Figures 3, 4 and 5 on pages 7 and 8. Note that in your kit the K3's bottom cover and KREF3 board are not yet installed. They will be added later.

☐ Replace the left side panel (with the handle) as follows:

Start the six 4-40 3/16" (4.8 mm) black flat head screws (SS) through the panel: three along the bottom, one at the top rear, one at the top front, and one just below the front end of the handle. It is normal to adjust the position of the panels slightly when assembling so the screw holes line up. The cabinet will become structurally sound and rigid with all the panels, including the top and bottom covers, are mounted.

Start one 4-40 3/16" (4.8 mm) black flat head screw (SS) at the top corner of the front panel assembly.

Inspect the area where the side panel meets the front panel shield, and make sure there is positive mechanical contact at the screw just below the end of the handle and about 3/4" (19 mm) above the RF board. The area of the side panel around that point is clean metal.

Tighten all seven screws. ***Be sure all the screws are tight, including the screw near the forward end of the handle that threads into the front panel shield.***

⚠ *CAUTION*

Failure to establish a solid contact at that point may result in birdies in the receiver.

☐ Fasten the top center of the front panel assembly to the front panel shield with a 4-40 3/16" (4.8 mm) black flat head screw (SS).

Resistance Checks

The following resistance checks confirm that the main power busses in the K3 aren't shorted to ground. If any of the values measured are lower than specified, inspect the unit carefully for loose hardware that is caught between components on the boards or for improperly mated connectors.

☐ Use your digital multimeter (DMM) to measure the resistance across the red and black 12VDC IN connectors on the rear panel. The resistance should be greater than 3K ohms. It may be much higher, depending upon which way you connect the leads. Your DMM may indicate the value is so high it is out of the range of the instrument and as it does when in ohms mode and the probes are not touching anything. If you are not sure, refer to your DMM instruction manual to interpret the reading.

☐ Use your DMM to measure the resistance between the end of R36 and ground at the exposed copper around the screws for the 2D fastener (see Figure 65). The resistance must be greater than 150 ohms.

199.7Ω

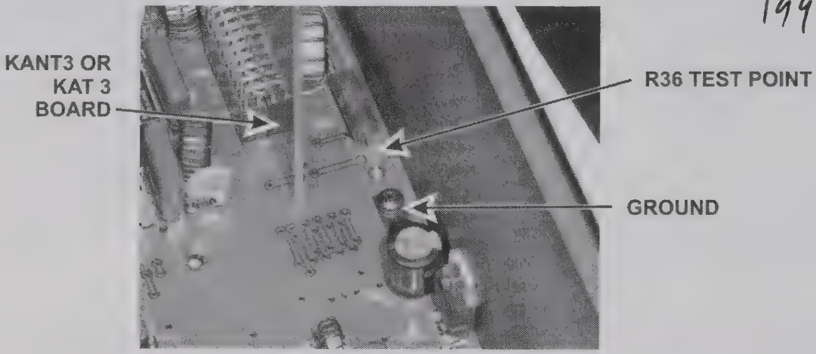


Figure 65. R36 Test Point.

☐ Use your DMM to measure the resistance between the terminal on U12 and ground shown in Figure 66 . The resistance must be greater than 500 ohms (although in some K3's it may be only slightly greater than 500 ohms).

643Ω

☐ Use your DMM to measure the resistance between the terminal on U13 and ground shown in Figure 66. The resistance must be greater than 125 ohms.

146Ω

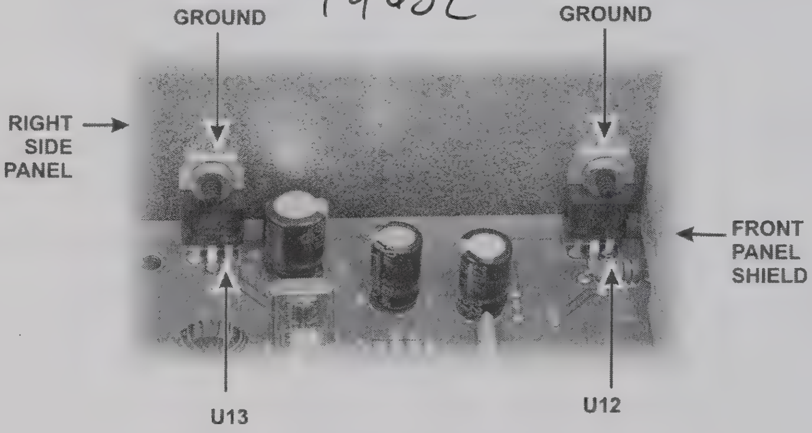


Figure 66. U12 and U13 Test Points.

Initial Power On Check

The following check confirms that the power supply and power control circuits are working properly. Be sure your K3 passes the resistance tests above before proceeding.

⚠ *CAUTION!*

If you see or smell smoke when applying power, turn the K3 off and remove the power cable immediately, then locate the source.

☐ Connect your 13.8 VDC power supply to the 12VDC IN connector on the rear panel. If you do not have a suitable cable handy, assemble the Power Supply Cable Kit supplied with your K3. Do not connect a key, microphone or other accessories to the K3 at this time.

☐ Tap (press for less than 1/2 second) the front panel **POWER** button and confirm the LCD display lights. There may be a delay of about 1 second before the display lights. Some front panel LEDs may light as well, and you may notice D33 on the RF board, next to the crystal filters, light. Ignore any error messages on the display and do not try to operate the radio at this time. You'll get to do that soon.

☐ Tap the front panel **POWER** button again to turn the K3 off and disconnect your external power supply.

KREF3 Reference Oscillator

KREF3 Description

The KREF3 module's 49.380-MHz temperature-compensated crystal oscillator (TCXO) is the common reference for the K3's synthesizers. See *Theory of Operation, KREF3*, in the K3 Owner's Manual for more information.

KREF3 Installation Procedure

☐ Locate the Temperature-Compensated Crystal Oscillator (TCXO) module. If you ordered the optional ±1 ppm TCXO it will be supplied ***instead*** of the standard 5 ppm module (see Figure 67).

Note the position of a small colored dot on the top of the module. It is sometimes faint and may be hard to see without good light. The dot allows you to orient the module correctly in the socket. Some modules have four pins while others have only three. If your module has three pins, the missing pin is in the same corner as the painted dot.

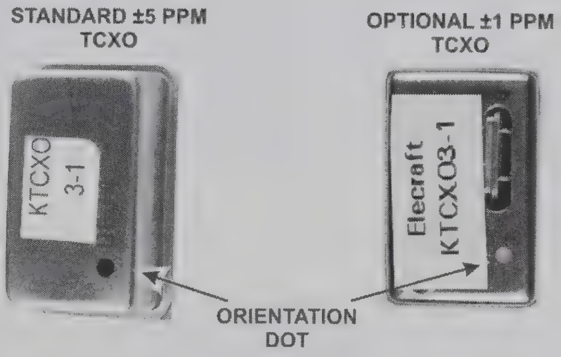


Figure 67. TCXO Modules.

If you have the optional ±1 ppm module, it is supplied with a thin flat insulator that fits over the pins to cover the bottom. Place the insulator over the pins. ***This insulator is not used on the standard ±5 ppm module.***

☐ Mount the TCXO module on the KREF3 board as shown in Figure 68. Be certain the leads go into the corner holes in the socket and the black dot is oriented toward connector J6 as shown. If you have a 1ppm high-stability module, the dot may be light brown and not as close to the corner. If the module has only three leads, the missing lead will be in the corner with the dot. If you have the standard 5ppm TCXO, the bottom may be slightly above the socket when the leads are fully inserted. Tighten the tie wrap enough to ensure the oscillator so it cannot fall out but do not bend the leads.

ESD SENSITIVE!

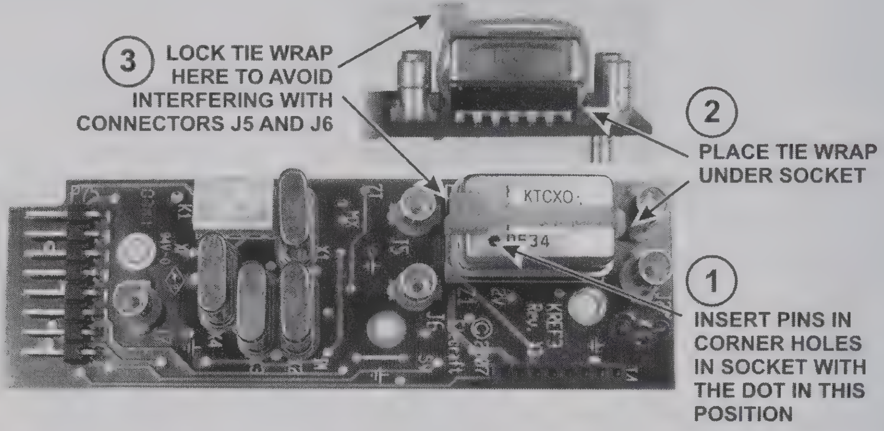

③ LOCK TIE WRAP HERE TO AVOID INTERFERING WITH CONNECTORS J5 AND J6
② PLACE TIE WRAP UNDER SOCKET
① INSERT PINS IN CORNER HOLES IN SOCKET WITH THE DOT IN THIS POSITION
KTCXO

Figure 68. Mounting TCXO Module on KREF3 Board.

☐ Inspect the bottom of the KREF3 to ensure no leads are higher than the chokes as shown below. The chokes are the highest of the black surface-mount components on the board. Use your diagonal cutters to trim any excessively long leads close to the board.

CAUTION

The objective is to be certain no bare leads touch the front panel shield when the board is installed in the next step. Do not add spacers or insulating material between the board and the front panel shield. It is important for proper shielding of the circuits that the board sit very close to the front panel shield.

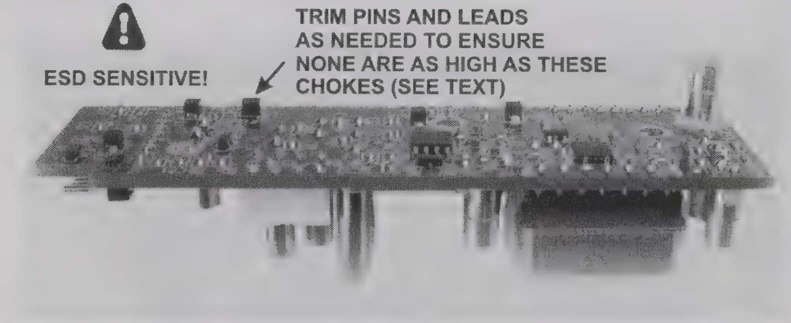

ESD SENSITIVE!
TRIM PINS AND LEADS AS NEEDED TO ENSURE NONE ARE AS HIGH AS THESE CHOKES (SEE TEXT)

Figure 69. Checking Lead Lengths on KREF3 Board.

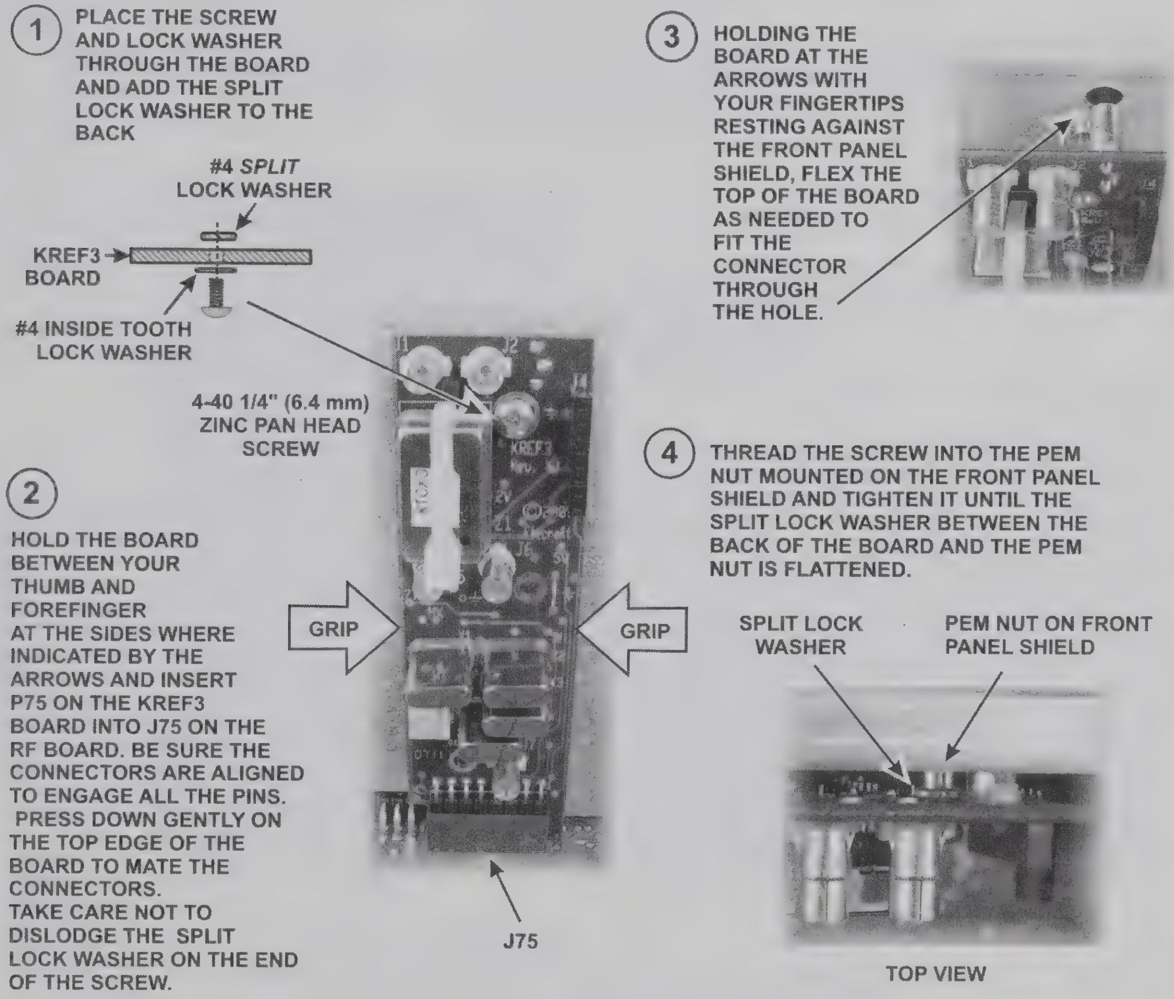
☐ If you are installing the K3EXREF option, mount the K3EXREF board on the KREF3 board as shown in the *K3 K3EXREF Frequency Lock Option* manual, Figures 8 and 9 (pages 9 and 10). Be sure to install the shorting block as shown in Figure 8. After the KREF3 board is in place, be sure to connect the TMP connector on the cable you installed earlier to the connector that passes through the front panel shield.

⚠ *CAUTION*

In the following step it is easy to drop screws and lock washers into the K3. If this happens, you must find and retrieve the hardware. Failing to do so may cause short circuits and damage your K3 when power is applied.

Recommend you practice installing the KREF3 board without the screw and washers first to acquaint yourself with the procedure for inserting it and fitting the connector through the hole in the front panel shield. You'll need to do this smoothly to avoid dropping the hardware.

☐ Install the KREF3 board on the back side of the front panel shield as shown in Figure 70. The board plugs into J75 just behind the shield. **Be certain you use a split lock washer between the KREF3 board and the PEM nut attached to the shield. An inside tooth washer may short out nearby circuit traces.**



① PLACE THE SCREW AND LOCK WASHER THROUGH THE BOARD AND ADD THE SPLIT LOCK WASHER TO THE BACK

② HOLD THE BOARD BETWEEN YOUR THUMB AND FOREFINGER AT THE SIDES WHERE INDICATED BY THE ARROWS AND INSERT P75 ON THE KREF3 BOARD INTO J75 ON THE RF BOARD. BE SURE THE CONNECTORS ARE ALIGNED TO ENGAGE ALL THE PINS. PRESS DOWN GENTLY ON THE TOP EDGE OF THE BOARD TO MATE THE CONNECTORS. TAKE CARE NOT TO DISLODGE THE SPLIT LOCK WASHER ON THE END OF THE SCREW.

③ HOLDING THE BOARD AT THE ARROWS WITH YOUR FINGERTIPS RESTING AGAINST THE FRONT PANEL SHIELD, FLEX THE TOP OF THE BOARD AS NEEDED TO FIT THE CONNECTOR THROUGH THE HOLE.

④ THREAD THE SCREW INTO THE PEM NUT MOUNTED ON THE FRONT PANEL SHIELD AND TIGHTEN IT UNTIL THE SPLIT LOCK WASHER BETWEEN THE BACK OF THE BOARD AND THE PEM NUT IS FLATTENED.

#4 *SPLIT* LOCK WASHER
KREF3 BOARD
#4 INSIDE TOOTH LOCK WASHER
4-40 1/4" (6.4 mm) ZINC PAN HEAD SCREW
GRIP
GRIP
J75
SPLIT LOCK WASHER
PEM NUT ON FRONT PANEL SHIELD
TOP VIEW

Figure 70. Installing KREF3 Board.

☐ If you are installing the K3EXREF option, connect the TMP connector on the cable leading to the rear panel REF connector to the connector on the KREF3 board that passes through the front panel shield.

KSYN3 Synthesizer

KSYN3 Description

The KSYN3 module is a high-performance, wide-range synthesizer covering 8 to 46 MHz. It uses a crystal-filtered DDS (direct digital synthesis) reference. This in turn drives a VCO with a high C/L ratio, resulting in very low phase noise. See *Theory of Operation, KSYN3*, in the K3 Owner's Manual for more information. The KSYN3 is supplied with a stiff metal plate covering the front of the pc board. This plate keeps the board from vibrating, especially if the K3 is operated with its internal speaker at high volumes.

KSYN3 Installation Procedure

☐ Confirm that the screw, washer and nut are mounted on the bottom corner of the KSYN3 board as shown in Figure 71. Note that the nut is on the side with the stiffener plate.

⚠ *CAUTION*

The hardware should be tightened only enough to begin to compress the lock washer. Over-tightening may compress the thin adhesive between the stiffener plate and the pc board, causing short circuits under the stiffener plate.

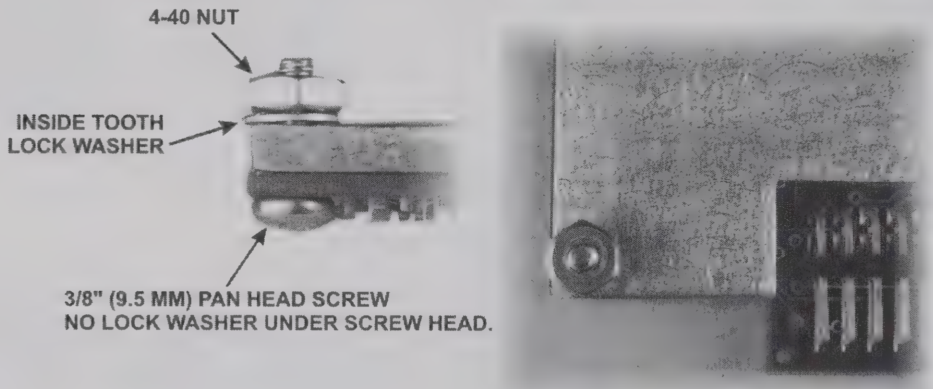

4-40 NUT
INSIDE TOOTH LOCK WASHER
3/8" (9.5 MM) PAN HEAD SCREW
NO LOCK WASHER UNDER SCREW HEAD.

Figure 71 Stiffener Fastener on KSYN3 Board.

☐ Inspect the bottom of the KSYN3 board to ensure no leads are higher than the chokes as shown below. The chokes are the highest of the black surface-mount components on the board. Use your diagonal cutters to trim any excessively long leads close to the board.

⚠ *CAUTION*

The objective is to be certain no bare leads touch the front panel shield when the board is installed in the next step. Do not add spacers or insulating material between the board and the front panel shield. It is important for proper shielding of the circuits that the board sit very close to the front panel shield.

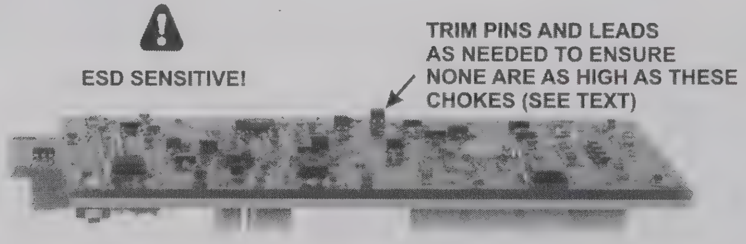

ESD SENSITIVE!
TRIM PINS AND LEADS AS NEEDED TO ENSURE NONE ARE AS HIGH AS THESE CHOKES (SEE TEXT)

Figure 72. Checking Lead Lengths on KSYN3 Board.

CAUTION

In the following step it is easy to drop screws and lock washers into the K3. If this happens, you must find and retrieve the hardware. Failing to do so may cause short circuits and damage your K3 when power is applied.

☐ Install the KSYN3 board on the back side of the front panel shield using the hardware exactly as shown in Figure 73. This is most easily done as follows:

Place an inside tooth lock washer over each 1/2" (12 mm) pan head screw, then place the screw in the hole in the KSYN3 board.

While holding the screws in place, add a split lock washer to each screw on the back side of the board. **Be sure you use split lock washers on the back of the board. Inside tooth lock washers may short out nearby circuit traces.**

Hold the board with the screws and washers in position by lightly pinching the corners of the board with your thumbs over the screw heads and index fingers holding the split lock washers in place on the back.

Position the board to mate P73 on with J73 on the RF board. Be sure you have the connectors properly aligned and mate them fully so the screws line up with the PEM nuts on the front panel shield.

Thread each screw into the PEM nut on the front panel shield. Be sure the split lock washer is still in place between the board and the PEM nut.

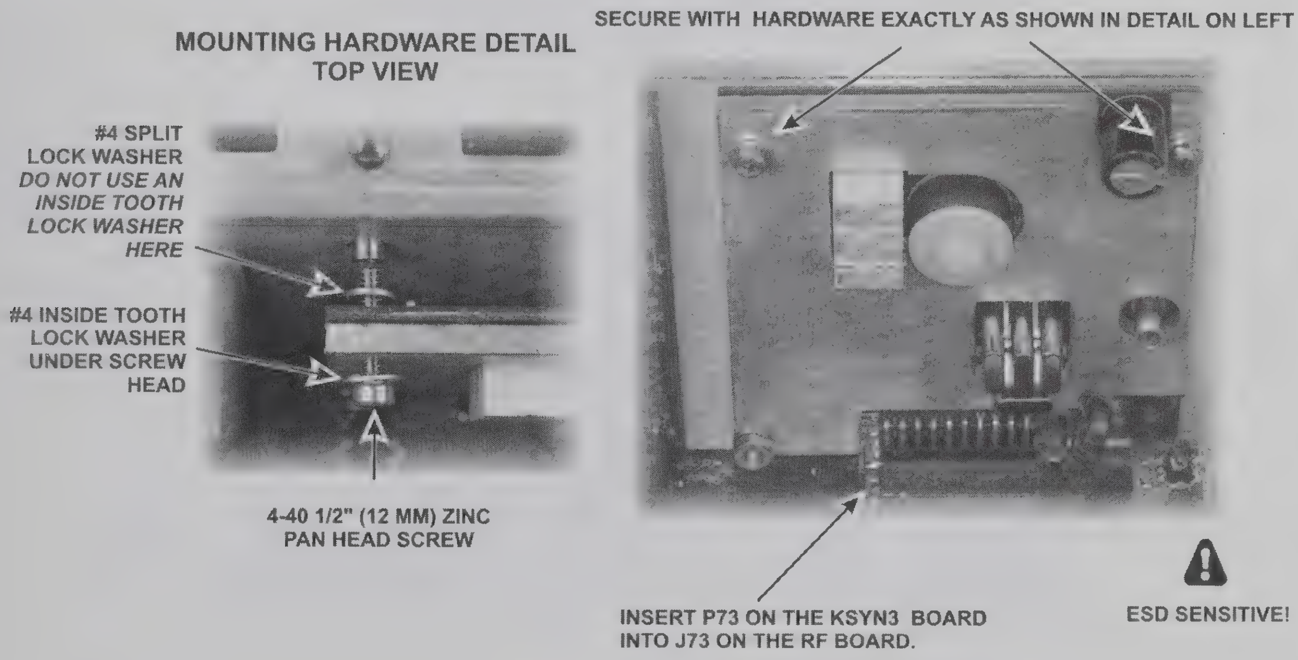

MOUNTING HARDWARE DETAIL
TOP VIEW
#4 SPLIT LOCK WASHER
DO NOT USE AN INSIDE TOOTH LOCK WASHER HERE
#4 INSIDE TOOTH LOCK WASHER UNDER SCREW HEAD
4-40 1/2" (12 MM) ZINC PAN HEAD SCREW
SECURE WITH HARDWARE EXACTLY AS SHOWN IN DETAIL ON LEFT
INSERT P73 ON THE KSYN3 BOARD INTO J73 ON THE RF BOARD.
ESD SENSITIVE!

Figure 73. Installing the KSYN3 Board.

☐ Locate the three TMP cables. They are about 1/8" (3 mm) diameter coaxial cables with connectors at each end as shown in Figure 74. Check each cable and trim any excess center conductor strands extending beyond the end of the pin as shown. This will make mating the connectors much easier.

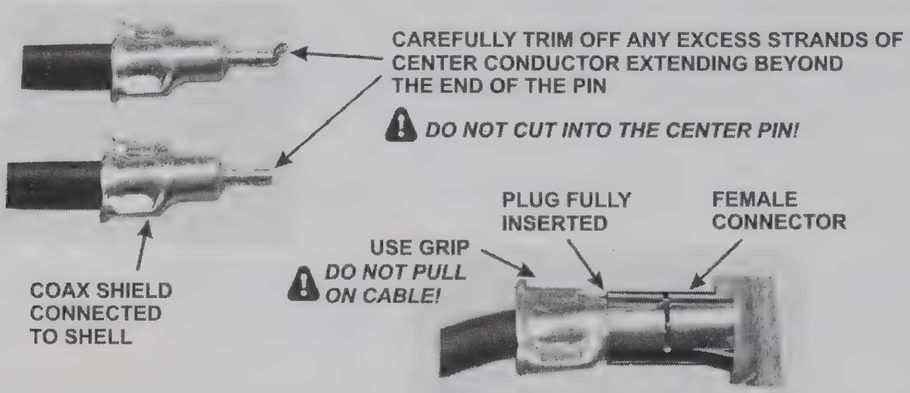

CAREFULLY TRIM OFF ANY EXCESS STRANDS OF CENTER CONDUCTOR EXTENDING BEYOND THE END OF THE PIN
⚠ DO NOT CUT INTO THE CENTER PIN!
COAX SHIELD CONNECTED TO SHELL
USE GRIP
⚠ DO NOT PULL ON CABLE!
PLUG FULLY INSERTED
FEMALE CONNECTOR

Figure 74. TMP Cable Connectors.

☐ Install the three TMP cables between connectors on the KREF3 board, the main RF board and the KSYN3 board as follows. Handle the connectors by the finger-grip area shown in Figure 74, especially if you unplug a connector. ***Do not pull on the coaxial cable to unplug a connector!*** When mating the connectors, be sure the plugs are fully inserted as shown in Figure 74. To make the connectors easier to mate, first be sure the center pin is started in the socket, then you may twist the connector back and forth while holding it by the metal ears if needed to seat if fully as shown in Figure 74.

_ KREF3 board J7 to RF board J65.

_ KREF3 board J6 to RF board J81.

_ KREF3 board J2 to KSYN3 board J83.

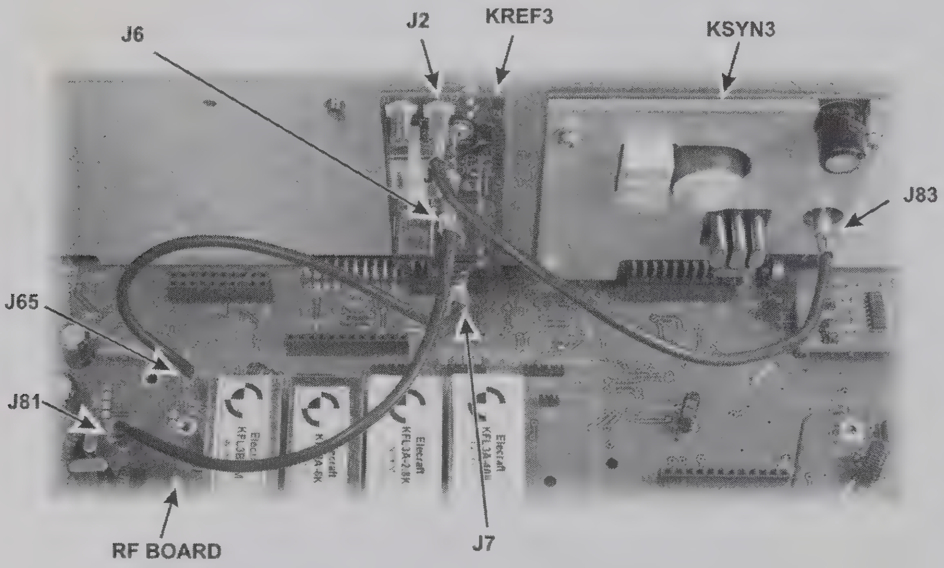


Figure 75. Installing KREF3 TMP Cables.

Loudspeaker

Loudspeaker Description

The built-in loudspeaker is mounted on the top cover. A grill cloth covering the sound holes keeps dust and debris from falling into the speaker cone. The loudspeaker is equipped with a magnetic shield to avoid unwanted interaction with nearby circuits.

Loudspeaker Installation Procedure

☐ Locate the top cover and check the inside for any masking tape still covering screw holes. If found, peel it off.

☐ Mount the chassis stiffening bracket on the underside of the cover as shown in Figure 76. Do not use washers.

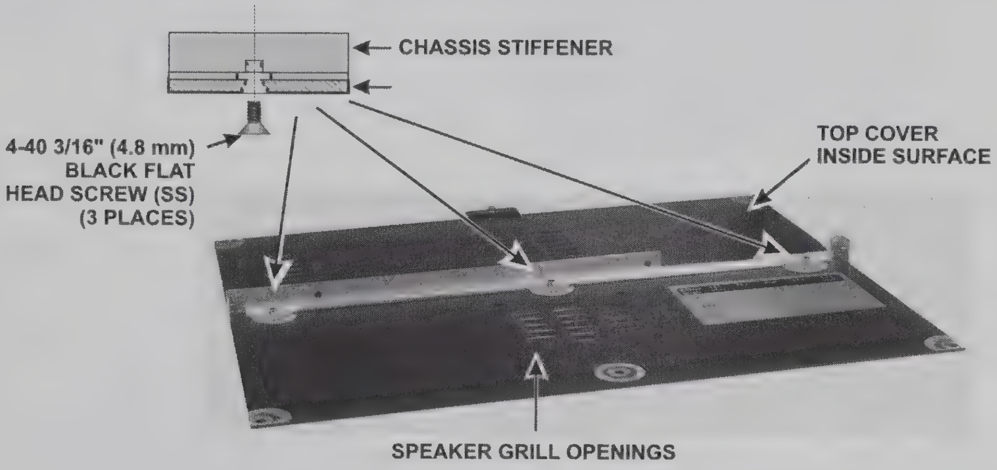


Figure 76. Attaching Chassis Stiffener to Top Cover.

☐ Trim the grill cloth to cover the speaker grill openings and overlap the four holes for the loudspeaker mounting screws. Mark and cut four holes in the grill cloth for screws to pass through the cloth. The grill cloth is shown as it must fit after the speaker is mounted in Figure 77. Normally, the stiffener will remain attached to the K3 when you remove the top cover. If you install the KPA3 100-watt amplifier, the stiffener will be attached to the KPA3 shield and cannot be removed with the cover (see Figure 81 on page 55). The grill cloth must be trimmed as shown so it cannot become trapped between the chassis stiffener and the top cover when the cover is removed and replaced.

⚠ *CAUTION!*

Failing to install the fiber washers as shown in the next step or over-tightening the screws so that the speaker mounting flanges are distorted may damage the speaker, causing distorted, fuzzy sound.

☐ Mount the speaker using the hardware shown in Figure 77. A suggested procedure for doing this is as follows:

Find a book or other flat-smooth surface that is about the size of the top cover.

From the top, place the screws in the four holes at the corners of the speaker grill area.

Cover the screw heads with the book and, holding it in place against the top cover, invert the cover and lay it with the book on your work table so the bottom side is facing upwards.

Trim and cut screw holes in the grill cloth as needed and position it over the four screws that are now held in place by the book. Trim the grill cloth so the cloth does not touch the stiffener.

Place a fiber washer on each screw so it rests on the grill cloth.

Position the loudspeaker on the four screws so they pass through the holes in the flanges. Orient the speaker so the wire exits toward the rear (the side nearest the stiffener).

Place a #4 internal tooth lock washer on each screw.

Start a 4-40 nut on each screw.

Pick up the entire assembly and tighten all four screws. ***Do not tighten the screws enough to bend the speaker flanges!***

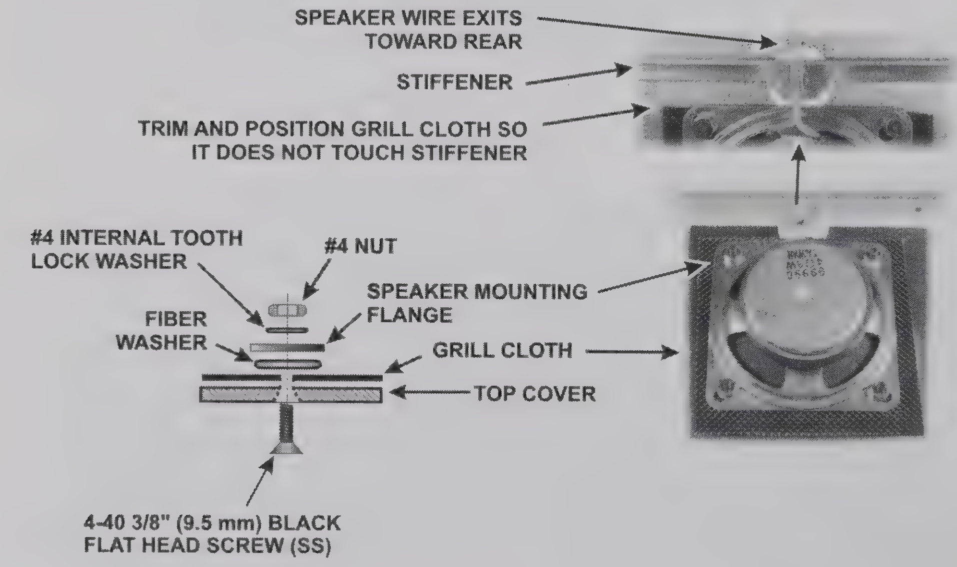

SPEAKER WIRE EXITS TOWARD REAR
STIFFENER
TRIM AND POSITION GRILL CLOTH SO IT DOES NOT TOUCH STIFFENER
#4 INTERNAL TOOTH LOCK WASHER
#4 NUT
SPEAKER MOUNTING FLANGE
FIBER WASHER
GRILL CLOTH
TOP COVER
4-40 3/8" (9.5 mm) BLACK FLAT HEAD SCREW (SS)

Figure 77. Mounting Loudspeaker.

☐ Install the shield over the speaker magnet as shown in Figure 78.

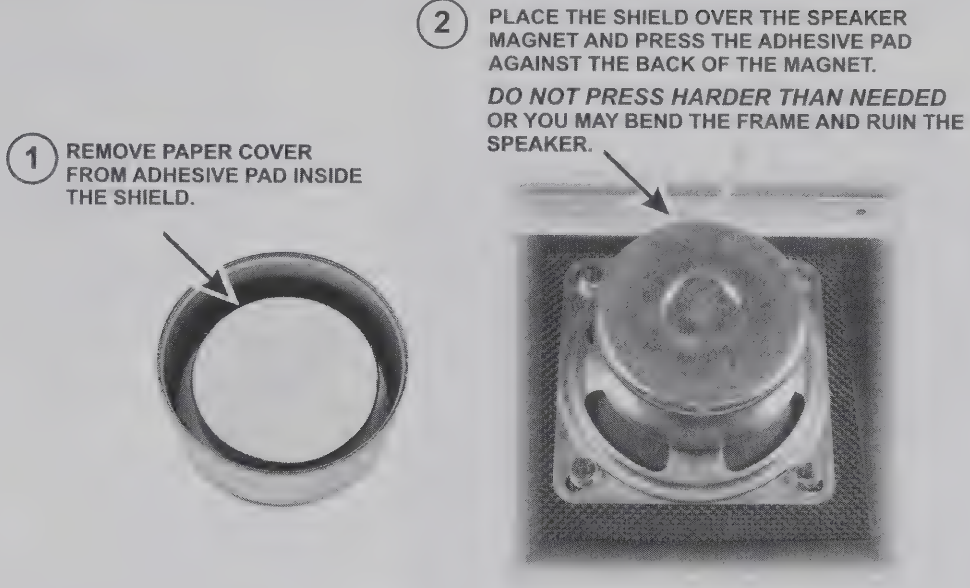

② PLACE THE SHIELD OVER THE SPEAKER MAGNET AND PRESS THE ADHESIVE PAD AGAINST THE BACK OF THE MAGNET.
DO NOT PRESS HARDER THAN NEEDED OR YOU MAY BEND THE FRAME AND RUIN THE SPEAKER.
① REMOVE PAPER COVER FROM ADHESIVE PAD INSIDE THE SHIELD.

Figure 78. Installing Speaker Magnet Shield.

KPA3 Shield

If you are ***not*** planning to install the KPA3 module at this time, skip this section and go directly to *Bottom Cover* on page 56. Only the KPA3 shield is installed at this time to avoid rework later. You will be directed to finish installing the KPA3 module after initial testing and calibration of your K3.

KPA3 Shield Description

The KPA 3 Shield is part of the optional KPA3 100-watt amplifier module. It isolates the high-level RF circuits in the KPA3 from the rest of the K3 and provides mechanical support for the amplifier module itself.

KPA3 Shield Installation Procedure

☐ Remove the shield from the KPA3 Option kit and position it over the holes in the RF board as shown in Figure 79. The holes in the shield must line up with the holes in the RF board.

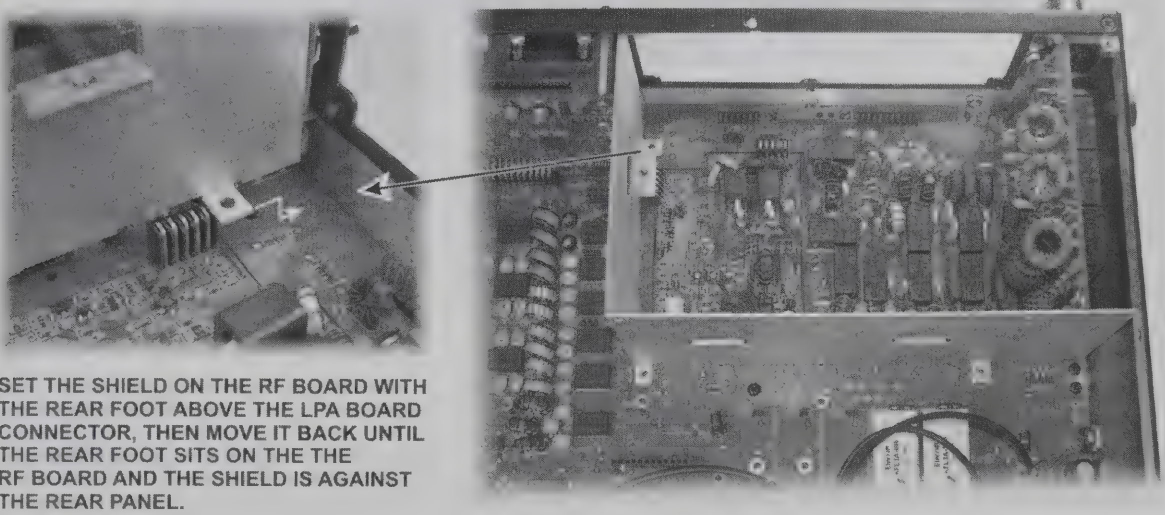

SET THE SHIELD ON THE RF BOARD WITH THE REAR FOOT ABOVE THE LPA BOARD CONNECTOR, THEN MOVE IT BACK UNTIL THE REAR FOOT SITS ON THE THE RF BOARD AND THE SHIELD IS AGAINST THE REAR PANEL.

Figure 79. Positioning the KPA3 Shield.

☐ Attach the shield to the RF board and to the rear panel as shown in Figure 80. The screws, washers and nut are in the KPA3 Option kit. The standoffs are part of the K3 kit hardware.

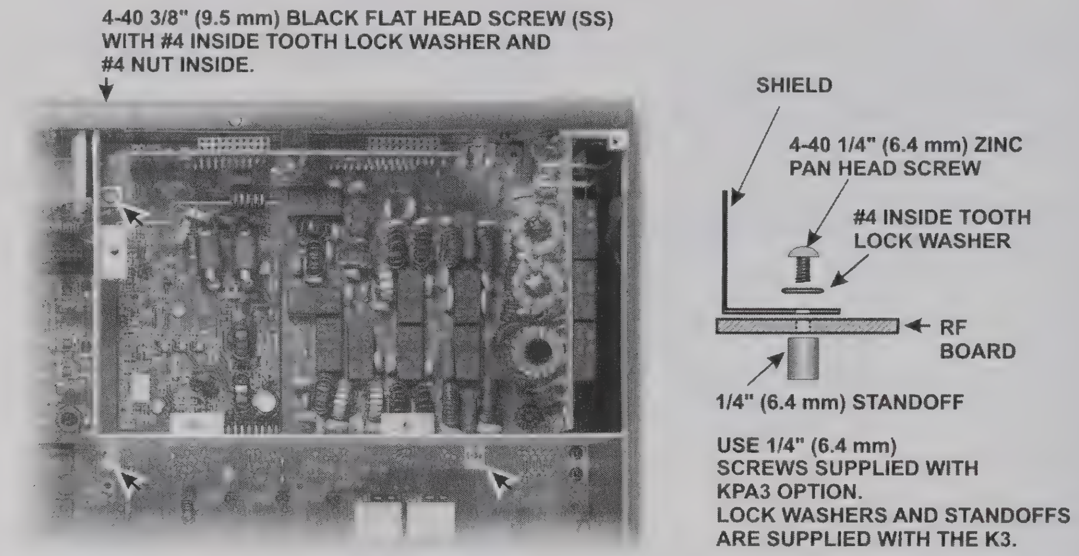


Figure 80. Attaching the KPA3 Shield.

☐ Remove the stiffener bar from the top cover and install it on the chassis as shown in Figure 81. The hardware required to attach it to the shield are in the KPA3 Option kit. The black flat head screws used to attach it to the side panels are part of the K3 kit hardware.

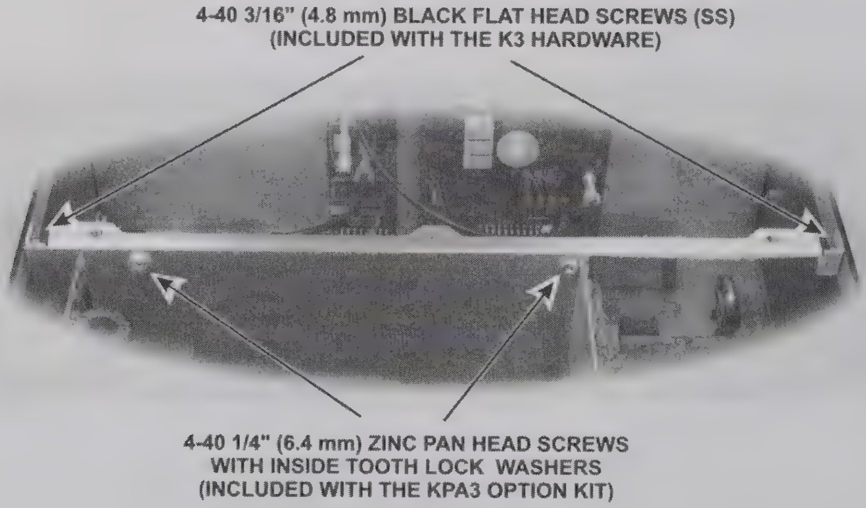

4-40 3/16" (4.8 mm) BLACK FLAT HEAD SCREWS (SS)
(INCLUDED WITH THE K3 HARDWARE)
4-40 1/4" (6.4 mm) ZINC PAN HEAD SCREWS
WITH INSIDE TOOTH LOCK WASHERS
(INCLUDED WITH THE KPA3 OPTION KIT)

Figure 81. Installing the Chassis Stiffener Bar.

Bottom Cover

Bottom Cover Description

The bottom cover is divided into two parts, the rear and forward sections. The rear section is slightly thicker than the forward section to act more efficiently as a heat sink for the LPA transistors. The bottom covers attach to standoffs as well as the 2D fasteners on the bottom of the RF Board. A folding tilt stand and feet are mounted on the cover panels.

Bottom Cover Hardware Installation Procedure

☐ Install the standoffs on the bottom of the RF board shown in Figure 82. If you installed the KPA3 shield, three of the four standoffs required are already in place. ***If so, be sure to install the remaining standoff!***

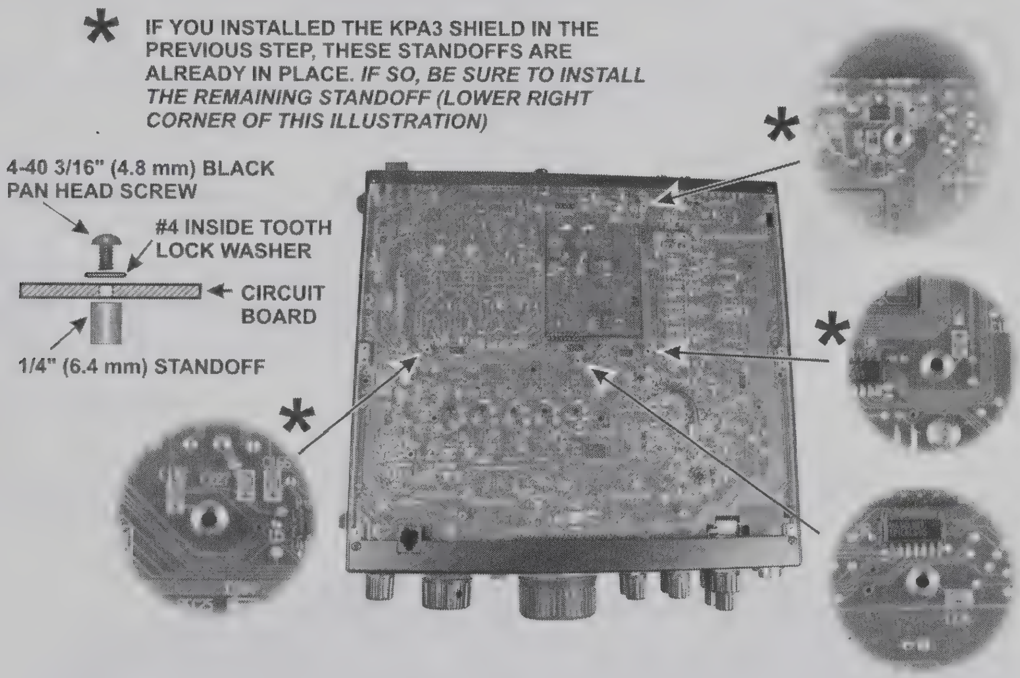

* IF YOU INSTALLED THE KPA3 SHIELD IN THE PREVIOUS STEP, THESE STANDOFFS ARE ALREADY IN PLACE. *IF SO, BE SURE TO INSTALL THE REMAINING STANDOFF (LOWER RIGHT CORNER OF THIS ILLUSTRATION)*
4-40 3/16" (4.8 mm) BLACK PAN HEAD SCREW
#4 INSIDE TOOTH LOCK WASHER
CIRCUIT BOARD
1/4" (6.4 mm) STANDOFF
*
*
*

Figure 82. Installing Standoffs on RF Board.

☐ Identify the bottom cover forward section by test fitting it on the bottom of the K3. The forward section is the thinner panel with a notch along one edge (see Figure 83).

☐ One side of the cover is fully painted. That is the outside. The other side has areas of bare metal left to ensure good electrical contact with the other cabinet parts. Check the inside surface for any masking tape left from the painting process. If found, peel it off.

☐ Attach the front feet and tilt stand to bottom cover section A as follows. Insert a 4-40 7/16" (11 mm) zinc pan head screw (SS) through the cover ***with the screw head on the inside***, and place a foot over the screw on the outside (fully painted) of the cover. Orient the foot as shown in Figure 83. Place a #4 lock washer (SS) and 4-40 nut (SS) on the end of the screw inside the hole in the foot, and put your finger over the hole to hold the nut against the screw. Turn the screw to start the nut onto the threads but do not tighten it. Repeat the procedure for the second screw in the foot. Leave the foot as loose as possible without the hardware falling off.

☐ Install the tilt stand and second foot as shown in Figure 83. You many need to press the foot against the tilt stand to get the 4-40 7/16" (11mm) screws (SS) to pass through the cover and foot. Put a #4 lock washer (SS) and nut (SS) on each screw as you did before.

☐ Tighten all four screws. It should not be necessary to put a tool on the nuts. Friction against the feet and the lock washers should hold them securely while you tighten them by turning the screw heads.

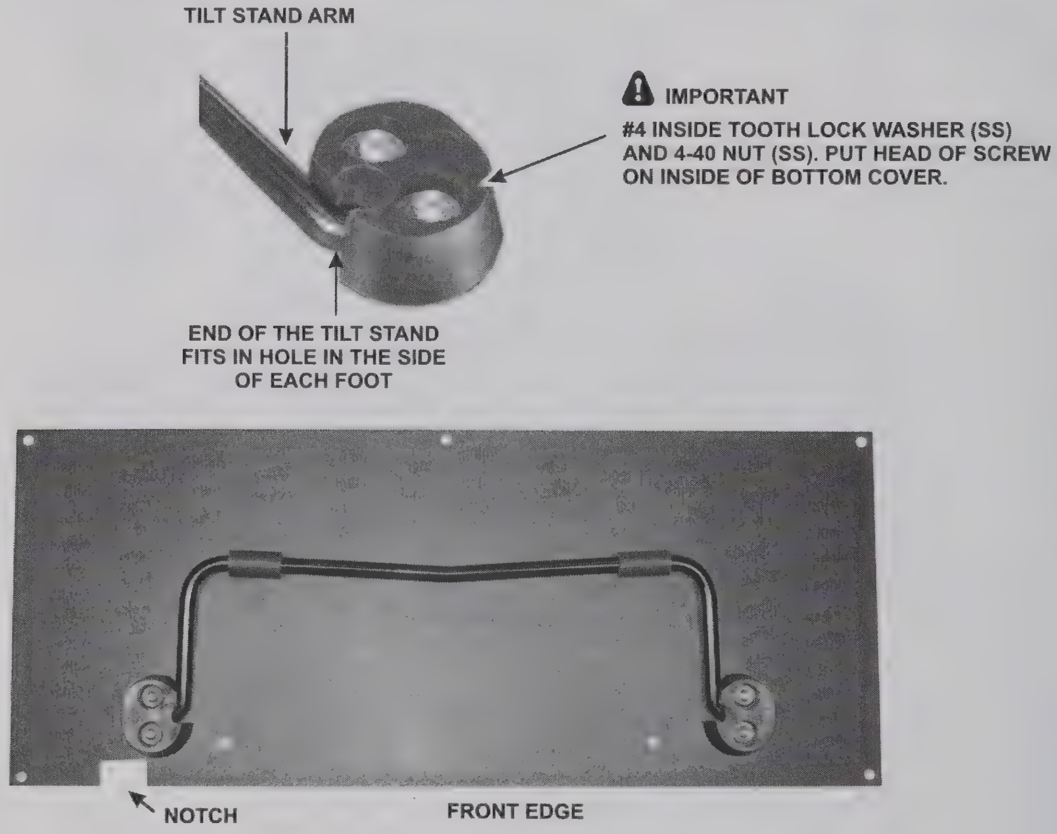

TILT STAND ARM
⚠ IMPORTANT
#4 INSIDE TOOTH LOCK WASHER (SS) AND 4-40 NUT (SS). PUT HEAD OF SCREW ON INSIDE OF BOTTOM COVER.
END OF THE TILT STAND FITS IN HOLE IN THE SIDE OF EACH FOOT
NOTCH
FRONT EDGE

Figure 83. Installing Tilt Stand.

☐ Locate the rear bottom cover section. This cover has eight rectangular slots cut in it. Like the front section, bare metal is exposed in some areas on the inside surface. The bare metal ensures good electrical contact with the other cabinet parts and good thermal contact with the heat sinks for Q2, Q4 and Q5 on the LPA circuit board.

☐ Check the inside surface of the bottom cover for any masking tape that may have been left from the painting process. If found, peel it off. Two of the screw holes inside bottom cover section B have ***not*** had the paint removed from them. These are the mounting holes for the two rear feet. Attach each foot as shown in Figure 84. Note that these screws are also installed with their heads on the inside surface.

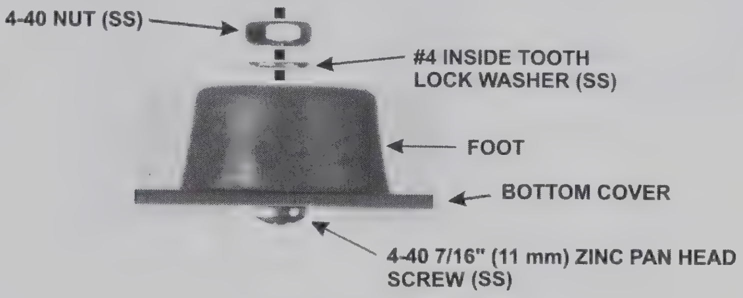

4-40 NUT (SS)
#4 INSIDE TOOTH LOCK WASHER (SS)
FOOT
BOTTOM COVER
4-40 7/16" (11 mm) ZINC PAN HEAD SCREW (SS)

Figure 84. Installing Rear Feet.

☐ Set both bottom covers aside in a safe place. They will be mounted on the K3 later.

KNB3 Noise Blanker Description

The KNB3 is one of two noise blanker systems in the K3. It is a narrow I.F. pulse blanker that plugs into the RF board. See *Theory of Operation, Noise Blanker* in the K3 Owner's Manual for more information

KNB3 Installation Procedure

☐ Install the standoff for the noise blanker as shown in Figure 85. The location of J77 is to the left of crystal filter position FL5 on the RF board. Be sure to put ***two*** split lock washers between the standoff and the RF board as shown.

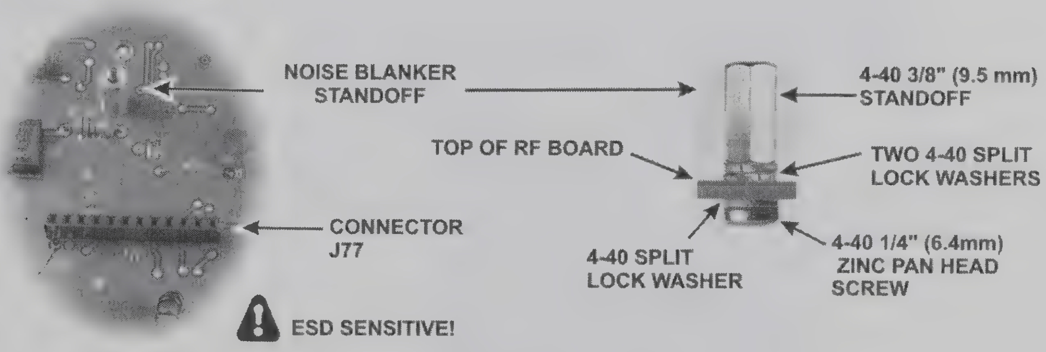

NOISE BLANKER STANDOFF
CONNECTOR J77
ESD SENSITIVE!
TOP OF RF BOARD
4-40 SPLIT LOCK WASHER
4-40 3/8" (9.5 mm) STANDOFF
TWO 4-40 SPLIT LOCK WASHERS
4-40 1/4" (6.4mm) ZINC PAN HEAD SCREW

Figure 85. Installing Noise Blanker Standoff.

☐ Plug the noise blanker board into J77 and attach it to the standoff using the hardware shown in Figure 86.

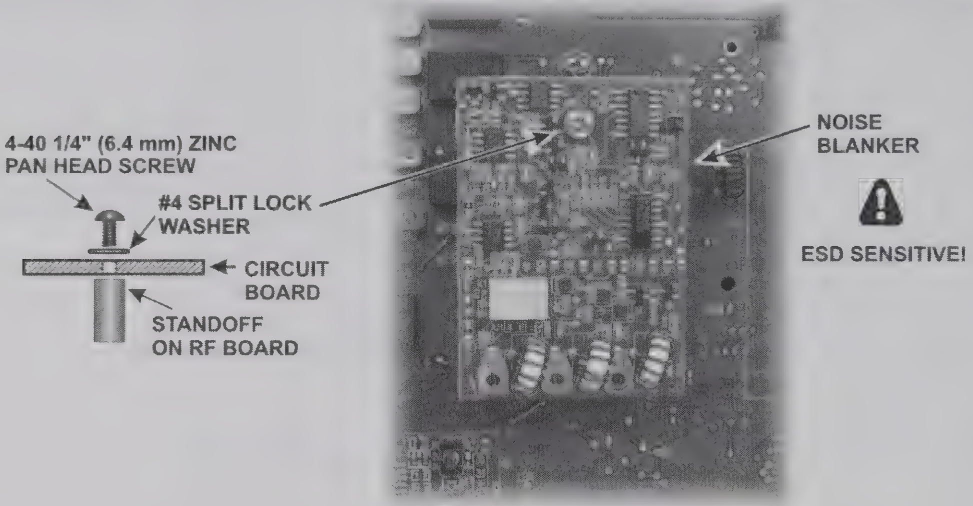


Figure 86. Installing the Noise Blanker Board.

Battery BT1

Battery BT1 Description

BT1 is a 3-volt lithium coin cell that provides the operating voltage for the real-time-clock IC (RTC) on the front panel when the K3 is turned off. Depending on the type of cell, BT1 could last from 2 to 10 years, thanks to the extremely low current drain of the RTC – on the order of a few microamperes. The RTC keeps track of the full date and 24-hour time, either of which can be displayed on the VFO B portion of the LCD.

Battery BT1 Installation Procedure

☐ Insert the CR2032 cell into battery holder BT1 as shown in Figure 87.

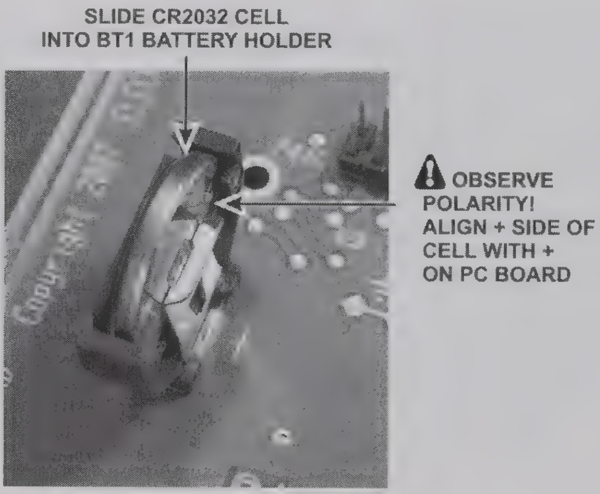


Figure 87. Installing BT1.

KBPF3 General Coverage Receive Option

If you have the KBPF3 General Coverage Receive option kit, install the board as follows. Otherwise skip this section and go directly to *Power Amplifier Jumper Block* on page 61.

KBPF3 Description

The KBPF3 extends the receive coverage outside of the Ham bands over the range of 500 KHz to 30 MHz and from 48 MHz through 54 MHz. Only the receiver coverage is extended. The transmitter frequency coverage is not affected.

KBPF3 Installation Procedure

☐ Install the board on the standoffs you installed earlier as shown in Figure 88. The screws and lock washers needed are supplied with your KBPF3 Option kit. There are three connectors on the bottom of the KBPF3 board that must be properly mated to P44A, P44C and P44E on the RF board. Even though the connectors are hard to see if they KPA3 shield is installed, they can be aligned as follows:

- Set the KBPF3 board in place over the standoffs, aligning it so the holes in the KBPF3 board are aligned with the tops of the standoff. This will align the connectors.
- Press down on the KBPF3 board to mate the connectors at the end near battery BT1 and along the side nearest the LPA board or, if installed, the KPA3 shield, while checking to ensure that the holes in the board are aligned with the holes in the standoffs. Note that simply installing the mounting screws will not ensure the 3-pin connectors are fully mated. When properly mounted the KBPF3 board should rest on top of the standoffs and be parallel with the RF board underneath.

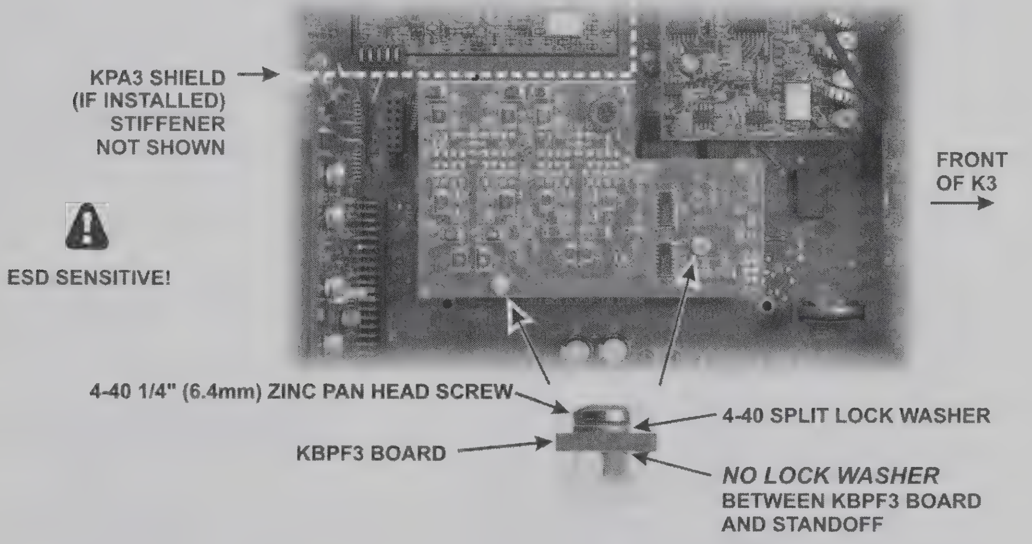
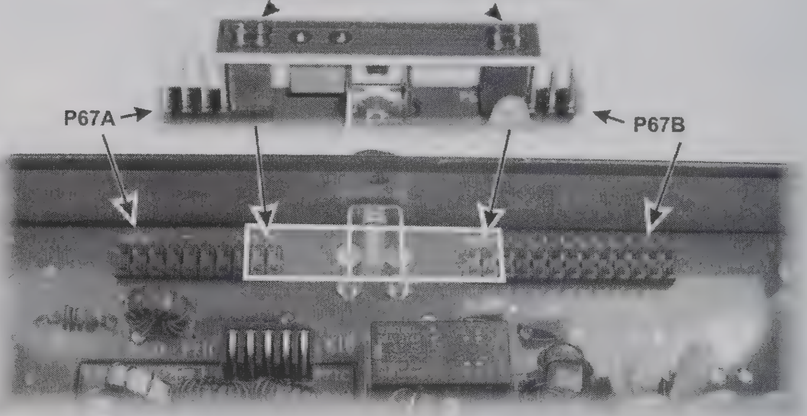

KPA3 SHIELD (IF INSTALLED) STIFFENER NOT SHOWN
ESD SENSITIVE!
FRONT OF K3
4-40 1/4" (6.4mm) ZINC PAN HEAD SCREW
4-40 SPLIT LOCK WASHER
KBPF3 BOARD
NO LOCK WASHER BETWEEN KBPF3 BOARD AND STANDOFF

Figure 88. Installing the KBPF3 Option Board.

Power Amplifier Jumper Block

The Power Amplifier (PA) jumper block is required to operate the K3 without the optional KPA3 100 watt power amplifier module installed. Your RF board was shipped with the jumper block installed. Even if you are planning to install the KPA3 at this time, do not remove it until instructed to do so. You will be performing some essential tests and calibration procedures before the KPA3 module is installed.

If you remove it for any reason before installing the KPA3, replace it as shown in Figure 89. ***Inspect the position of the jumper block carefully to endure it is mated with the four pins at the ends of both connectors. Your K3 may be damaged when power is applied if the jumper block is positioned incorrectly!***


PA JUMPER BLOCK ENGAGES THE FOUR PINS AT THE END OF P67A AND P67B
P67A
P67B

CAUTION!

YOUR K3 MAY BE DAMAGED IF THE JUMPER BLOCK DOES NOT ENGAGE THE FOUR PINS AT THE END OF EACH CONNECTOR!

THE JUMPER MAY BE ORIENTED EITHER WAY PROVIDED THE FOUR PINS AT EACH END ENGAGE AS SHOWN.

Figure 89. Installing the PA Jumper Block.

Finishing the Enclosure

Even though you may be planning to install the KPA3 100 watt amplifier at this time, you must complete the enclosure to run some essential tests and calibration procedures first. These tests require the enclosure panels be in place, particularly the bottom cover that acts as a heat sink for the low power amplifier (LPA) transistors.

Fan Opening Cover

A large opening in the rear panel is provided for fans required to cool the KPA3 100-watt amplifier module. If you did not purchase the KPA3 option with your kit, a blank panel is provided to cover this opening. If you purchased the KPA3 option with your kit, skip the following two steps and go directly to *AUX RF Cable* below.

☐ The blank panel has a BNC connector hole marked ANT3. This is for the optional K144XV module. If you do not have the K144XV, press a BNC Hole Cover into the opening in the panel with the small, smooth end of the cover on the side of the panel that has the ANT3 label.

☐ Install the panel in the opening on rear panel with a 3/16" (4.8 mm) black pan-head screw (SS) into the threaded bushing at each corner. Do not use washers under the screws.

AUX RF Cable

☐ If you installed the AUX RF connector for the KRX3 subreceiver, that cable should be lying near the rear panel. If the KPA3 shield is installed it will be inside the shield. Check the cable carefully to ensure you have fully insulated the metal conductor at the end. Failure to do so may result is severe damage to your K3 if it comes in contact with a live circuit. Recommend you tape the cable to the rear panel or, if the KPA3 shield is installed, tape it to the shield to keep it secure inside the K3.

Bottom Covers

☐ Turn the K3 over so the bottom is exposed. Position the forward section of the bottom cover with the feet and bail toward the front as shown in Figure 90. Attach the cover with seven 3/16" (4.8 mm) black pan head screws (SS) at the positions shown. Do not use washers.

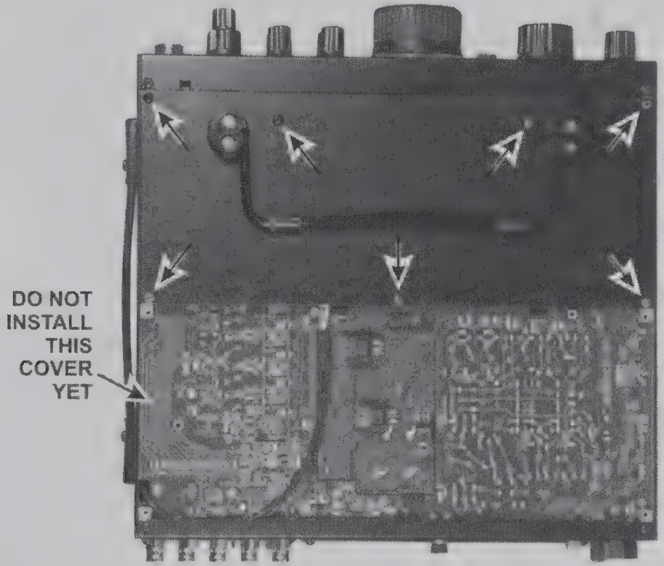


Figure 90. Installing Bottom Cover Forward Section.

☐ Locate the three thermal pads and clear the screw holes. They are already cut. If material is still covering the holes, push a small tool through the hole to remove the unwanted material. Remove the protective backing from each pad and press the adhesive side against a low-power amplifier transistor with the hole in the pad aligned with the screw hole in the transistor as shown in Figure 91. Take care not to disturb the position of the transistors over the standoffs.

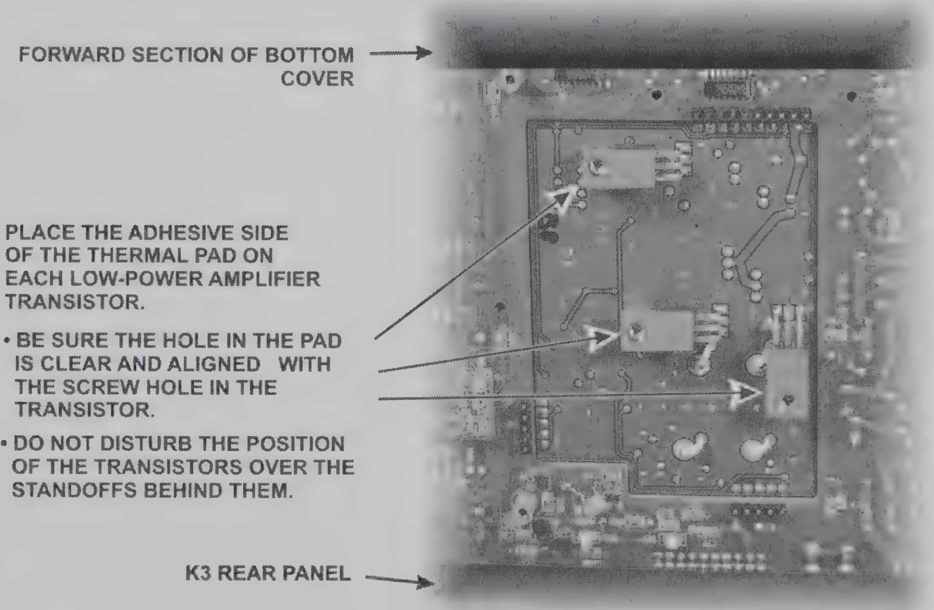

FORWARD SECTION OF BOTTOM COVER
PLACE THE ADHESIVE SIDE OF THE THERMAL PAD ON EACH LOW-POWER AMPLIFIER TRANSISTOR.
• BE SURE THE HOLE IN THE PAD IS CLEAR AND ALIGNED WITH THE SCREW HOLE IN THE TRANSISTOR.
• DO NOT DISTURB THE POSITION OF THE TRANSISTORS OVER THE STANDOFFS BEHIND THEM.
K3 REAR PANEL

Figure 91. Installing the Low Power Amplifier Transistor Thermal Pads.

☐ Install the rear bottom cover section as follows (see Figure 92):

Position the cover so the holes near the center line up with the transistors on the LPA board. The remaining holes will line up with 2D fasteners and standoffs.

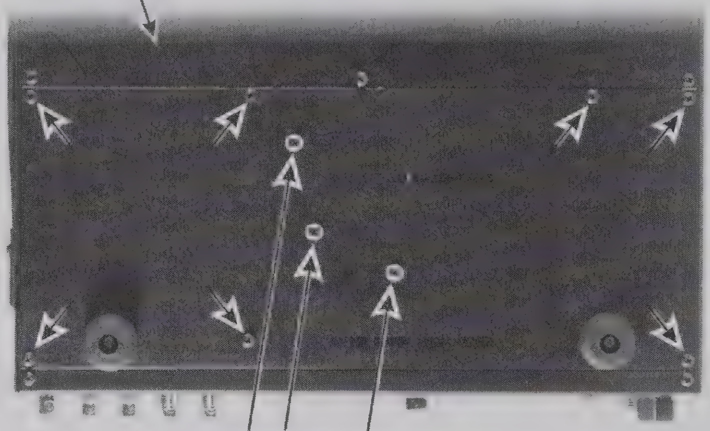
Note: The bottom cover is anodized, not painted. There is a circular area around the three holes on the inside surface that was masked to retain the bare metal. This circular area may not cover the entire area of the thermal pads of all three transistors. That is normal. The thermal pads will efficiently transfer the heat even if part of one or more extends onto the anodized area.

Start three 4-/40 1/4" (6.4 mm) black pan head screws (SS) into the transistors through the holes near the center with a #4 inside tooth lock washer under each screw head. Do not tighten the screws yet.

Start seven 4-40 3/16" (4.8 mm) black pan head screws (SS) into the remaining holes. Do not use washers.

Tighten all ten screws.

FORWARD SECTION INSTALLED EARLIER



CAUTION! THE POWER TRANSISTORS MAY FAIL IF INSIDE TOOTH LOCK WASHERS ARE NOT INSTALLED UNDER THE THREE SCREWS SHOWN .

Figure 92. Checking Power Transistor Mounting Hardware.

☐ Inspect the bottom cover screws to ensure you have inside tooth lock washers under the three screws shown in Figure 92. **Be sure all three screws are tight.**

Top Cover

Even if you have the KPA3 100-watt module to install, install the top cover and speaker at this time for initial testing and calibration of the basic 10-watt K3 configuration.

☐ Connect the speaker cable to P25 of the KIO3 board as shown in Figure 93. If you have the KPA3 shield installed, route the speaker wire under the stiffener bar.

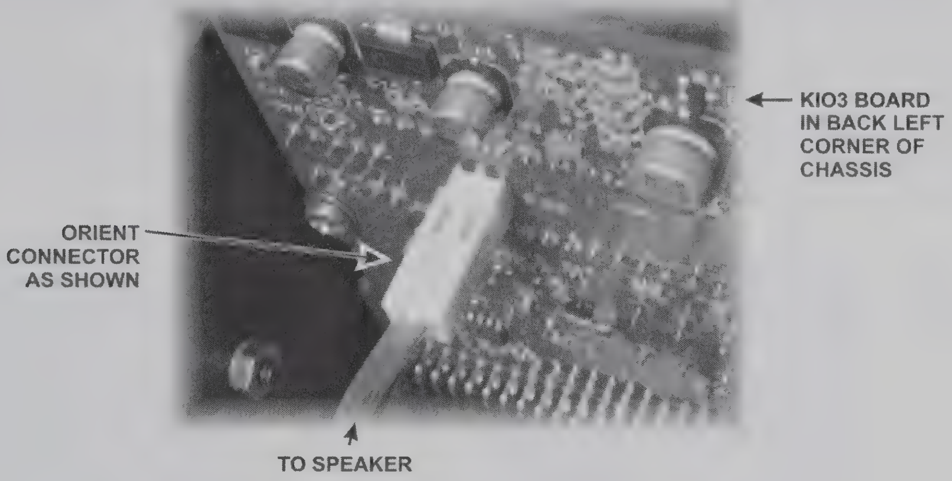
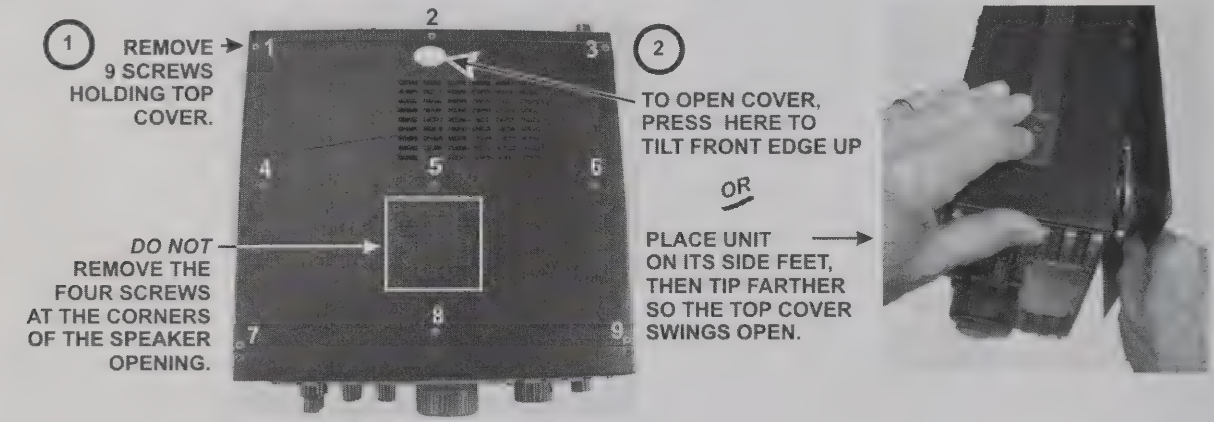

KIO3 BOARD IN BACK LEFT CORNER OF CHASSIS
ORIENT CONNECTOR AS SHOWN
TO SPEAKER

Figure 93. Connecting Speaker to KIO3 Board.

☐ Place the top cover on the K3 with the tab at the rear extending under the lip of the rear panel. Secure the top cover with six 4-40 3/16” (4.8 mm) black flat head screws (SS) along the front and rear edges of the cover. You may find it necessary to loosen screws at the top of the side, front and rear panels to adjust their position so the top cover fits properly.

☐ If you have the KPA3 shield installed, place three 4-40 3/16" (4.8 mm) black flat head screws (SS) through the holes across the middle of the cover to secure it to the stiffening bar. If you have not installed the KPA3 shield, the stiffening bar is still attached to the top cover where you mounted it to measure the speaker grill cloth for trimming. Place a 4-40 3/16" (4.8 mm) black flat head screw (SS) into each side panel to secure the ends of the stiffening bar.

> ⚠. ***The screws that hold the top cover in place are an important part of the structural design that provides excellent structural rigidity in spite of its light weight. Be sure all the screws are in place and tight whenever you replace the cover or other panels.***
>
> ***When removing the top cover in the future, the normal procedure is to remove the nine screws on top, leaving the stiffening bar on the chassis (see Figure 94 . If the KPA3 100-watt amplifier is installed, this is the only way the top cover can be removed because the rear shield installed with the KPA3 attaches to the stiffening bar.***



①
REMOVE 9 SCREWS HOLDING TOP COVER.
1
2
3
4
5
6
7
8
9
DO NOT REMOVE THE FOUR SCREWS AT THE CORNERS OF THE SPEAKER OPENING.
②
TO OPEN COVER, PRESS HERE TO TILT FRONT EDGE UP
OR
PLACE UNIT ON ITS SIDE FEET, THEN TIP FARTHER SO THE TOP COVER SWINGS OPEN.

Figure 94. How to Remove the Top Cover.

This completes the assembly of your K3/10 Transceiver. Next perform the Initial Test and Calibration procedures below to ensure your K3 is operating properly. Once they have been completed you can proceed to install other options, including the KPA3 100-watt amplifier module, at any time. Each option is supplied with its own installation manual.

> ⚠ ***PARTS LEFT OVER?***
>
> ***You may find that you have extra screws, washers or nuts after completing the assembly of your K3. This is normal. Extras of parts most easily lost during assembly are frequently included.***

Test and Calibration

It's time to apply power! In the following tests and procedures you will check out and calibrate essential functions of your basic K3. You must complete these procedures before operating your K3 at low power or before installing a KPA3 100-watt power amplifier option.

Have your K3 Owner's Manual handy. Detailed procedures are in your Owner's Manual where you can find them easily in the future if you need them.

> ⚠ **YOUR K3 WILL NOT OPERATE, OR WILL NOT OPERATE CORRECTLY, until you complete the Test and Calibration procedures below, including:**
>
> - **Synthesizer Calibration.**
> - **Filter Setup (all five procedures listed for *each* filter installed).**
> - **Reference Oscillator Calibration.**
> - **TX Gain Calibration on *all* bands.**

⚠ **Using Tap/Hold Switches:** Most K3 switches have two functions. ***Tapping*** activates the function labeled on the switch. ***Holding*** (~1/2 sec.) activates the function labeled beneath the switch.

Initial Power Checks

☑ Connect your 13.8 VDC nominal (11-15 VDC) power supply to the red and black 12VDC IN connector on the back of your K3. Don't connect anything else to your rig until instructed to do so.

☑ On the front panel, tap **POWER** to turn the K3 on. The LCD display should illuminate as it did before. It will probably show an error message, e.g. ERR PLL or ERR PL1. This is normal! It is reporting that the synthesizer has not been calibrated. Tap **DISP** (display) to clear the error message. Other error messages may follow, depending upon which modules you have installed, indicating that they have not been initialized yet. Press display until you have cleared the error messages. done

> ⚠ **Always turn your K3 off by pressing the POWER button. Removing DC power while the K3 is on can, on rare occasions, result in corrupted data in the EEPROM requiring you to reload the firmware.**

Synthesizer Calibration

☑ Hold **CONFIG** to access the configuration menu, then rotate VFO B to display TECH MD. Set the TECH MD parameter to ON with VFO A.

☑ Refer to the *Calibration Procedures* in you Owner's Manual and perform the *Synthesizer* calibration.

☑ When the calibration process is completed, press the BAND switch to cycle through all the bands from 160 meters through 6 meters and verify that there are no CAL PLL error messages on the display. That indicates that the synthesizer is calibrated on all the bands.

None

ok 11/20

Filter Setup

☐ Turn to the *Crystal Filter Installation and Setup* section of your Owner's Manual and perform the following procedures. If you have installed standard Elecraft 5-pole filter(s) you will need the FREQ OFFSET data you recorded earlier on page 12.

- *Filter Bandwidth Setup* ✓ ok
- *Filter Center Frequency Setup* o
- *Receive Filter Enables* ✓ ok
- *Filter Loss Compensation* ✓ ok
- *Transmit Filter Selection* ✓ ok

⚠ **The transmit filter selection setup requires that you select a valid transmit filter for each mode. If you fail to do so, you will see ERR TXF and have no RF output when you attempt to transmit.**

Reference Oscillator Calibration

☐ Turn to the *Calibration Procedures*, *Reference Oscillator* section in your Owner's manual and perform either of the reference oscillator calibration procedures found there. One of the procedures uses an off-air signal and requires no external test equipment. If you installed the K3EXREF option, refer to *Using the K3EXREF* on page 4 of the *K3 K3EXREF Frequency Lock Option* manual for testing and operating instructions.

TX Gain Calibration

If you do not have a computer, turn to the *Calibration Procedures*, *Transmitter Gain* section in your Owner's manual and perform the manual *Low-Power (5W) TX Gain Calibration* procedure.

⚠ **Note:** If you perform the manual procedure in the Owner's manual, when you press ANT to select ANT1 or press BYPASS to put the ATU in bypass mode, the display will read NO ATU even if you have installed the KAT3 ATU module. If you have the installed the KAT3 ATU, it will be enabled next section after this calibration is done.

If you have a Windows, Linux or Macintosh computer with an RS232 interface and cable, and an internet connection, perform the automated TX Gain calibration using the K3 Utility program as follows:

☐ Install the Elecraft K3 Utility Ver. 1.1.12.29 or later on your computer. The utility is available for downloading from the Elecraft web site: www.elecraft.com

☐ Connect your computer to your K3's RS232 port and start the K3 Utility program.

☐ Click on the K3 Utility "Configuration" tab, "Calibrate Transmitter Gain…" and perform the 5-Watt Transmitter Gain Calibration.

Option Modules

Enable Modules

☐ Enable the KNB3 noise blanker and, if installed, the KBPF3, KAT3, KDVR3 and KXV3 option modules as described in the *Option Module Enables* section of your Owner's Manual. Even though they are installed, these modules will not function until they are enabled.

KPA3 100-Watt Amplifier Installation

☐ If you purchased the KPA3 100-watt amplifier option, turn to the *KPA3 Option Installation Instructions* manual *Installation Procedure* to complete installation and testing now.

KRX3 Subreceiver Installation

☐ If you purchased the KRX3 subreceiver, turn to the *KRX3 High-Performance Subreceiver Installation and Operation* manual to complete the installation. Since you have already installed the Auxiliary DSP board, begin with the section *Checking and Modifying Resistor R91* and continue on with all the steps to the end of the manual.

Other Calibration Procedures

Wattmeter Calibration (Optional)

The wattmeter is reasonably accurate as it is supplied. However, if you have an accurate external wattmeter you can adjust the K3 to match its readings at low power (5 watts), high power (50 watts), and, if you have the KXV3 module installed, at 0.5 milliwatts output at the KXV3 transverter interface. Refer to *Calibration Procedures, Wattmeter* in your Owner's Manual.

S-Meter Calibration (Optional)

The S-meter calibration is normally quite accurate with the default settings provided. If you have an accurate 50-ohm, 50-microvolt signal generator (such as the Elecraft XG1 or XG2) you can calibrate the S-meter yourself. Refer to *Calibration Procedures, S-Meter* in your Owner's manual.

Appendix A Illustrated Parts List

Your kit contains a number of envelopes, boxes and packages of parts. Check the contents of each one carefully against the following lists. You may find extra screws, nuts and other small parts provided in case you lose one. They may be in a separate bag or mixed in with the others.

Printed Circuit Boards

Each board is packaged in its own ESD-safe bag identified by the part numbers shown below. The photographs are provided to help you identify each board. You may find that some of the components or component locations on the boards you receive are slightly different from those shown.

⚠ CAUTION!

DO NOT DISTURB ANY ADJUSTMENTS ON THE BOARDS

Each board was tested and aligned for optimum performance at the factory. Any change to these adjustments will degrade the performance of your K3 or prevent its operation altogether. All user calibrations and adjustments are done in firmware using the front panel menus. These are described at the appropriate points in the assembly procedures and in the Owner's Manual.

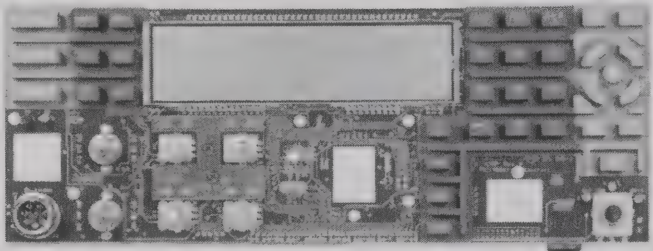
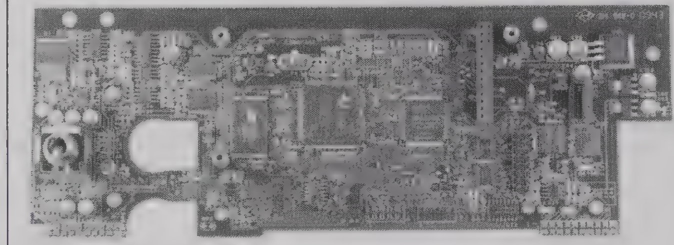
ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	Front Panel Printed Circuit Board Assembly ⚠ ***ESD Sensitive***	1	E850242
	K3 DSP Printed Circuit Board Assembly ⚠ ***ESD Sensitive***	1	E850233

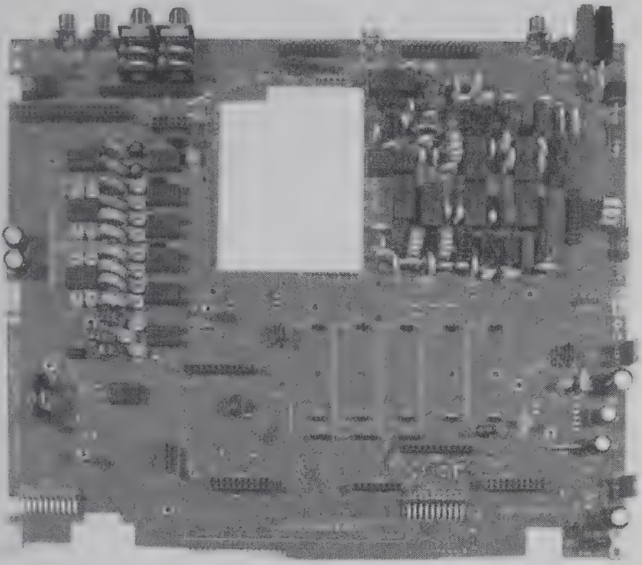
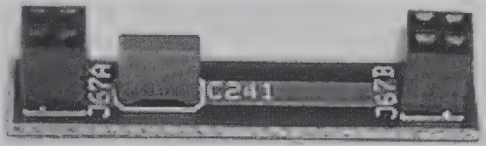
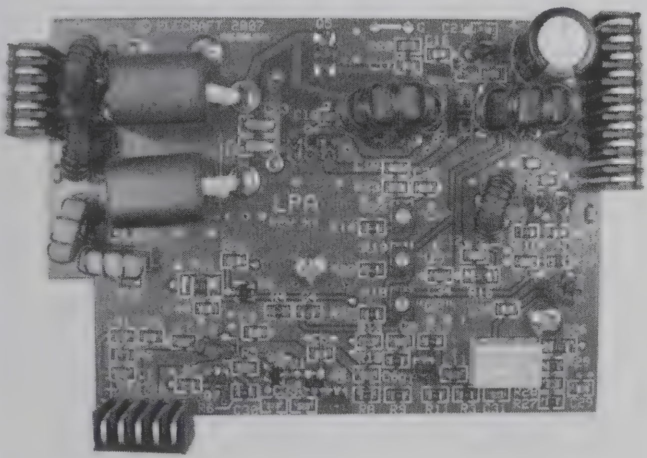
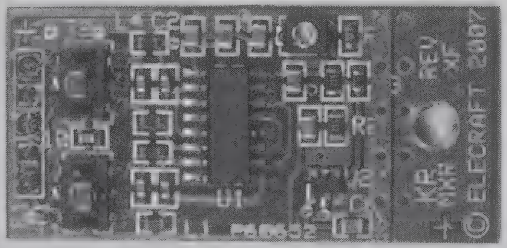
ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	RF Board ⚠ ***ESD Sensitive***	1	E850261
	PA Jumper Block Assembly (pre-installed on RF board)	1	E850322
	Low Power Amplifier (LPA) Board ⚠ ***ESD Sensitive.***	1	E850256
	K3 Mixer Board ⚠ ***ESD Sensitive.***	1	E850257

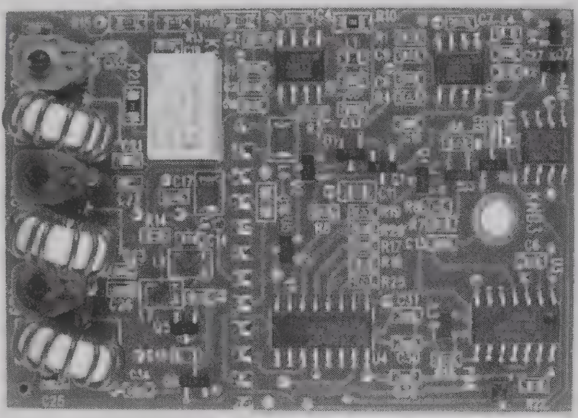
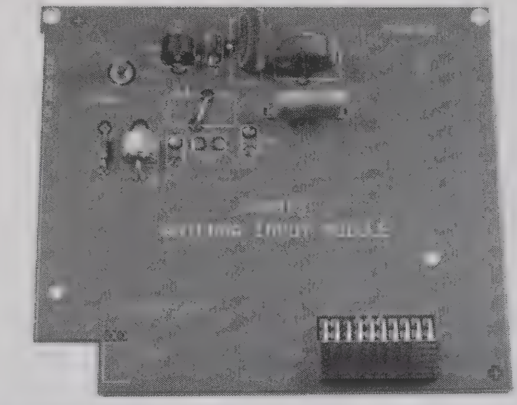
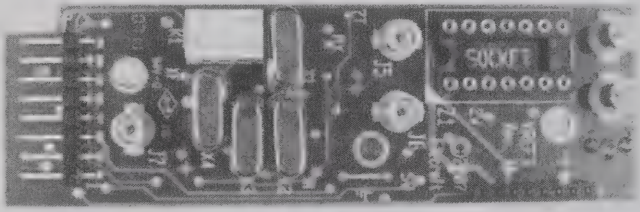
ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	KNB3 Noise Blanker Board ⚠ ***ESD Sensitive.***	1	E850280
	KANT3 Antenna Input Module **Notes:** 1)This board is not supplied if you purchased the KAT3 automatic antenna tuner option with your K3 kit. 2) Due to design changes, L3 may not be present. (You may see clipped leads where it was removed. That is normal,) Also, on some boards C6 and C5 may not be present.	1	E850248
	KREF3 Board ⚠ ***ESD Sensitive.***	1	E850254

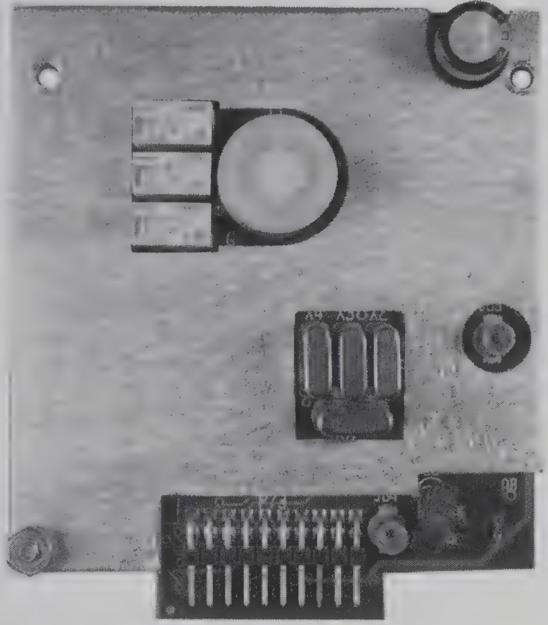
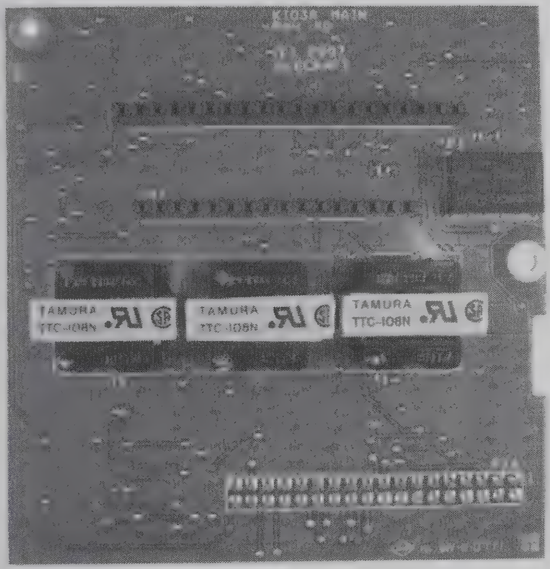
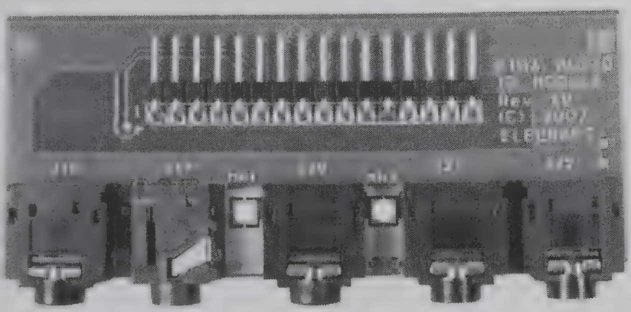
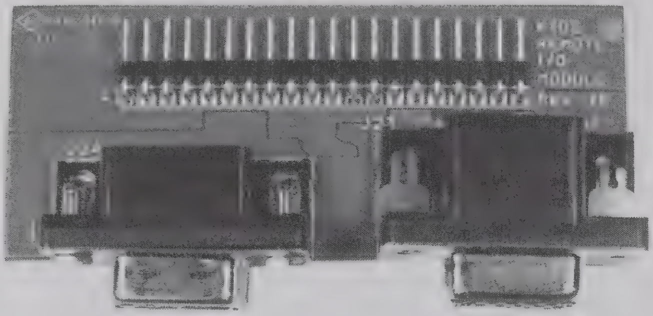
ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	KSYN3 Board ⚠ ***ESD Sensitive***	1	E850402
 TAMURA TTC-108N TAMURA TTC-108N TAMURA TTC-108N	KIO3 Main Board ⚠ ***ESD Sensitive.***	1	E850237
	KIO3 Audio I/O Module ⚠ ***ESD Sensitive.***	1	E850236

ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	KIO3 Remote (Digital) I/O Module ⚠ ***ESD Sensitive.***	1	E850235

E850262 Enclosure

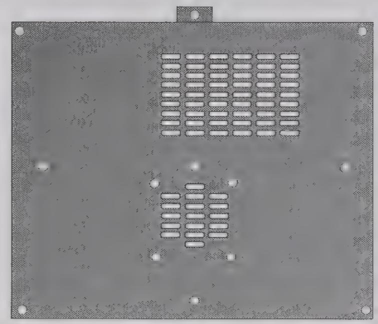
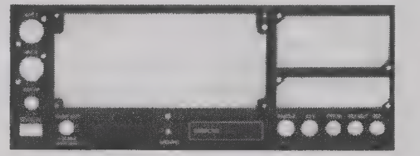
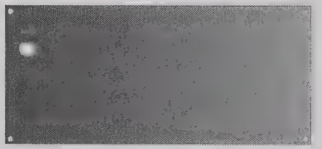
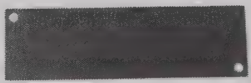
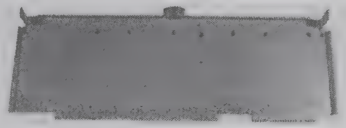
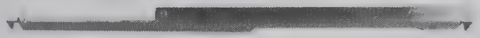
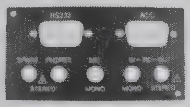
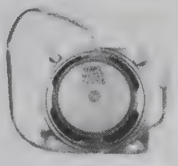
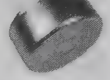
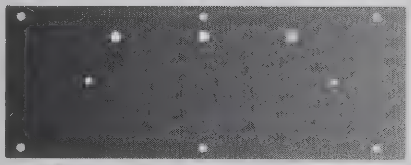
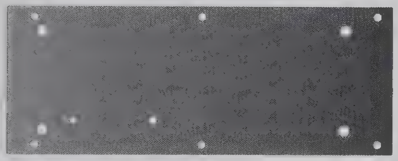
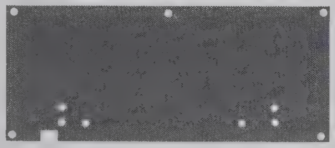
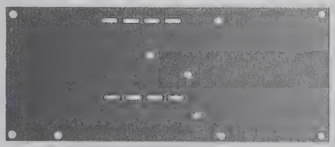
ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	Front Panel	1	E100209SS
	Top Cover	1	E100212
	Rear Panel	1	E100214SS
	Panel, Blank (KPA3 Fans) **Notes:** This part is not supplied if you purchased the KPA 100 watt amplifier option with your K3 kit.	1	E850297
	Panel, Blank (KXV3 I/O) **Note:** This part is not supplied if you purchased the KXV3 I/O option with your K3 kit.	1	E850296

ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	Front Panel Shield	1	E100216
	Chassis Stiffener	1	E100222
	KIO3 Panel	1	E850315
	Loudspeaker with attached wire and connector	1	E850300
	Loudspeaker Shield	1	E980087

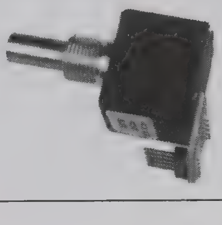
E850312 (Part of E850262 Enclosure)

ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	Left Side Panel	1	E100210
	Right Side Panel	1	E100211

E850313 (Part of E850262 Enclosure)

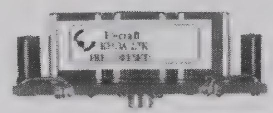
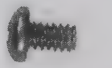
ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	Bottom Cover A	1	E100213
	Bottom Cover B	1	E100221

E850239 K3 FP Encoder Assembly Bag

ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	Encoder Assembly	2	E850239

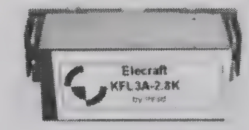
E850249 I.F. Crystal Filter Bag (or Box)

NOTE: If the optional 8-pole 2.8K filter is purchased instead (see next item) this filter is not supplied.

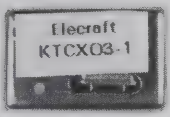
ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	KFL3A-2.7K Filter **Note:** This filter is not supplied if you purchased the optional 8-pole 2.8 kHz filter with your K3 kit.	1	E850249
or 	Screw, 4-40, either 1/4" (6.4 mm) Zinc, Pan Head or 3/16" (4.8 mm), Pan Head screw.	1	E700005 or E700015
or	Lock Washer, #4, Inside Tooth or Split Ring	1	E700010 or E700004

E850249 I.F. Crystal Filter Bag (or Box)

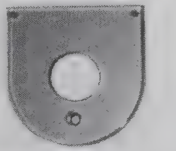
OPTION: Not supplied unless ordered. Otherwise the standard 5-pole filter (above) is supplied.

ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	KFL3A-2.8K Filter (optional, see above)	1	E850249
or See Note in Description	Screw, 4-40, either 1/4" (6.4 mm) Zinc, Pan Head or 3/16" (4.8 mm), Pan Head screw.	1	E700005 or E700015
or	Lock Washer, #4, Inside Tooth or Split Ring	1	E700010 or E700004

E850323 KREF3 TCXO Module Bag

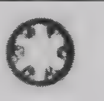
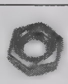
ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	KREF3 TCXO Module, 49.380 MHz, ±5 ppm stability **Note:** This module is not supplied if you purchased the optional ±1 ppm module with your kit.	1	E660033
	KREF3 TCXO Module, 49.380 MHz, (optional) ±1 ppm stability.	1	E660034
Rectangular Insulator the size of the TCXO	TCXO spacer (supplied only with optional KTCXO3-1 module)	1	E980146
	Tie Wrap, KREF3 TCXO. Module	1	E980145

E850307 K3 Front Panel Bezels and Serial Number Label

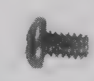
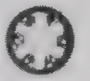
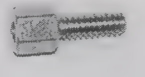
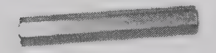
ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	Bezel (LCD cover), K3	1	E100195
	Trim Panel, K3 VFO	1	E100197
	Serial Number Label (supplied in envelope marked E850298)	1	E980137

E850229 SO239 Ant Connector Assembly Bag

(Note: If you purchased the KAT3 Automatic Antenna Tuner, your kit will include two of these bags.)

ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	SO239 (UHF) Female Panel Mount Connector with cable	1	E850229
	Screw, 4-40, 1/4" (6.4 mm) Black, Pan Head	2	E700009
	Lock Washer, #4, Inside Tooth	2	E700010
	Nut, 4-40	2	E700011

E850238 KIO3A Hardware Bag

ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	Screw, 4-40, 1/4" (6.4 mm) Black, Pan Head	4	E700009
	Screw, 4-40, 1/4" (6.4 mm) Zinc, Pan Head	2	E700005
	Lock Washer, #4, Inside Tooth	2	E700010
	Jackscrew Nut, 4-40 Note: Two of the jackscrew nuts may be mounted on the DB-9 connector on the Remote I/O Board.	4	E700078
	Standoff, 4-40, 1-1/4" (31.8 mm) long	2	E700119

E850263 K3 Miscellaneous Bag

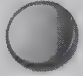
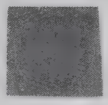
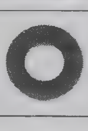
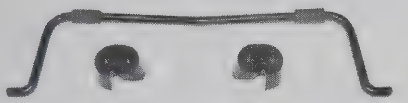
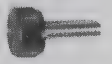
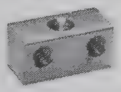
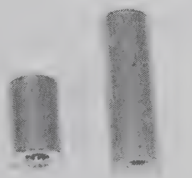
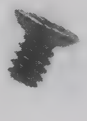
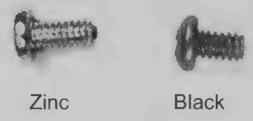
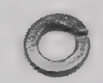
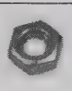
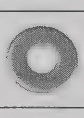
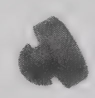
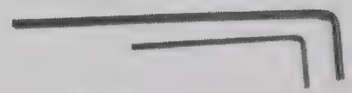
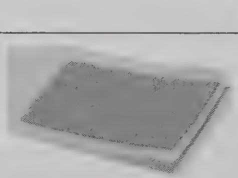
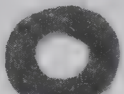
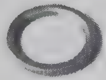
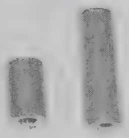
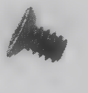
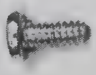
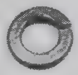
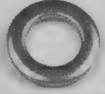
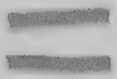
ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	TMP Cables	3	E100282
	Battery BT1 (CR2032)	1	E850058
	Loudspeaker Grill Cloth	1	E850089
	#4 Fiber Washer	4	E700031
 Front Feet with Stand Rear Feet	Bottom Feet with tilt stand	1	E980098
	SO239 Hole Cover	1	E980135
	BNC Hole Cover	3	E980136
	Thumbscrew, #6	1	E700070
	2D Fastener	10	E100078
Typical Standoffs (May be round or hexagonal) 	Standoff, 4-40, 1/4" (6.4 mm) long	6	E700026
	Standoff, 4-40, 3/8" (9.5 mm) long	2	E700153
	Standoff, 4-40, 1/2" (13 mm) long	3	E700061

ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	Screw, 4-40, 3/16” (4.8 mm) Black, Flat Head	27	E700025
	Screw, 4-40, 3/8” (9.5 mm) Black, Flat Head	6	E700131
	Screw, 4-40, 1/2” (13 mm) Black, Flat Head	1	E700132
	Screw, 6-32, 1/4” (6.4 mm) Black Flat Head	3	E700186
Typical Pan Head Screws  	Screw, 4-40, 3/16” (4.8 mm), Black, Pan Head	38	E700015
	Screw, 4-40, 1/4” (6.4 mm) Zinc, Pan Head	20	E700005
	Screw, 4-40, 1/4” (6.4 mm) Black, Pan Head	3	E700009
	Screw, 4-40, 7/16” (11 mm) Zinc, Pan Head	7	E700032
	Screw, 4-40 1/2” (12 mm) Zinc, Pan Head	2	E700196
	Lock Washer #4, Split	40	E700004
	Lock Washer, #6, Split Ring	3	E700041
	Lock Washer, #4, Inside Tooth	23	E700010
	Nut, 4-40	15	E700011
	Nut, 6-32	3	E700040
	Washer, Flat, #6	2	E700067
	Grommet Bumper, 7/16” Round (Side panel feet)	4	E980141
	Allen Wrench, 5/64” (in envelope)	1	E980004
	Allen Wrench, .050” (in envelope	1	E980008
	Thermal Pads (inside small envelope)	3	E700002

E850241 Front Panel Hardware Bag

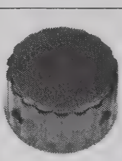
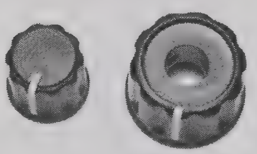
ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	Felt Washer	3	E700033
	Knurled Nut (Phones Jack)	1	E700138
Typical Standoffs 	Standoff, 2/56, 5/16" (7.9 mm) long	2	E700122
	Standoff, 4-40, 5/16" (7.9 mm) long	2	E700121
	Standoff, 4-40, 5/8" (15.9 mm) long	3	E700003
	Standoff, Nylon, 5/8" (15.9 mm) long	1	E700163
	Screw, 4-40, 3/16" (4.8 mm) Black, Flat Head **Note:** There is an 5/16" (7.9 mm) black flat head screw in the Front Panel Bezel envelope. See note below.	1	E700025
	Screw, 2-56, 5/32" (4.0 mm) Black, Pan head (See Note Below)	4	E700149
	Screw, 2-56, 1/4" (6.4 mm) Black, Pan Head (See Note Below)	4	E700124
	Screw, 4-40, 1/4" (6.4 mm) Zinc, Pan Head	7	E700005
	Lock Washer, #2, Split	2	E700123
	Lock Washer #4 Split	9	E700004
	Nut, 1/2" (13 mm) Hex	6	E700125
	Lock Washer, 1/2" (13 mm) Inside Tooth	5	E700150
	Washer, Flat, Phones Jack Spacer	1	E700145
 (Soft Foam Strips)	Front Panel Light Blocker (2 strips in envelope)	1	E850324

Note: The black pan head 2-56 screws are supplied in separate envelopes. Do *not* mix them up. You will be instructed when to use each size screw in the assembly procedure. Using the wrong screw may destroy your front panel circuit board. Also, the VFO A Trim Panel envelope contains a 4-40 5/16" (7.9mm) black flat head screw. Do not mix this screw up with the shorter black flat head screws supplied.

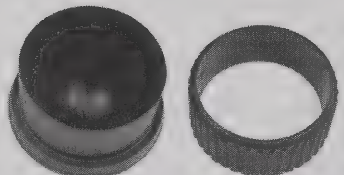
E850308 K3 Front Panel Knobs

ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	Knob, Small Encoder Shaft	4	E980088

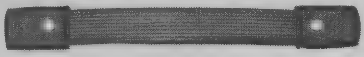
E850305 K3 Front Panel Knobs

ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	Knob, VFO B Tuning	1	E980090
	Knob, RIT/XIT	1	E980089
	Knob, Concentric Shaft, Large	2	E980092
	Knob, Concentric Shaft, Small	2	E980091

E850306 K3 Knob and Band for VFO A

ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	Knob, VFO A Tuning	1	E980093
	Finger Grip, Main VFO Tuning Knob	1	E980094

E850316 Carrying Handle Bag

ILLUSTRATION	DESCRIPTION	QTY	ELECRAFT PART NO.
	Handle (strap, spring insert and two end caps)	1	E850317
	Screw, 6-32, 1/2” (13 mm), Black, Pan Head (in envelope)	2	E700042
	Lock Washer, #6, Split (in envelope)	2	E700041
	Nut, 6-32 (in envelope)	2	E700069

E850301 Power Cable Kit

Bag with components and instructions sheet.

Non- Warranty Service

Please read the Elecraft Limited Warranty below.

A minimum charge of $99.00 will be charged for non-warranty service.

You will be notified by email when service is completed, along with the final cost of parts and service, and payment instructions.

Repair and Warranty Information

This replaces the Warranty Statement in the manual supplied with your product.

Elecraft's 1-Year Limited Warranty

This warranty is effective as of the date of first consumer purchase (or if shipped from factory, date product is shipped to customer). It covers both our kits and fully assembled products. For kits, before requesting warranty service, you should fully complete the assembly, carefully following all instructions in the manual.

Who is covered: This warranty covers the original owner of the Elecraft product as disclosed to Elecraft at the time of order. Elecraft products transferred by the purchaser to a third party, either by sale, gift or other method, who is not disclosed to Elecraft at the time of original order, are not covered by this warranty. If the Elecraft product is being bought indirectly for a third party, the third party's name and address must be provided to Elecraft at time of order to insure warranty coverage.

What is covered: During the first year after date of purchase, Elecraft will replace defective or missing parts free of charge (post-paid). We will also correct any malfunction to kits or assembled units caused by defective parts and materials. Purchaser pays inbound shipping to Elecraft for warranty repair, Elecraft will pay shipping to return the repaired equipment to you by UPS ground service or equivalent to the continental USA and Canada. Alaska, Hawaii and outside U.S. and Canada actual return shipping cost paid by owner.

What is not covered: This warranty does not cover correction of kit assembly errors. It also does not cover misalignment; repair of damage caused by misuse, negligence, or builder modifications; or any performance malfunctions involving non-Elecraft accessory equipment. The use of acid-core solder, water-soluble flux solder, or any corrosive or conductive flux or solvent will void this warranty in its entirety. Also, not covered is reimbursement for loss of use, inconvenience, customer assembly or alignment time, or cost of unauthorized service.

Limitation of incidental or consequential damages: This warranty does not extend to non-Elecraft equipment or components used in conjunction with our products. Any such repair or replacement is the responsibility of the customer. Elecraft will not be liable for any special, indirect, incidental or consequential damages, including but not limited to any loss of business or profits.

Cronological

That slender pillar is the main return path for an ampere or more of RF current flowing between the KAT3 board and the rear panel sockets. As someone whose design instincts were developed at VHF, where all RF ground paths must be short, broad and direct, I didn't feel comfortable about that corner of the K3.

Yes, we know that "it works" and "it's good enough for HF". But in these days of compulsory EMC testing and microscopically detailed product reviews, even HF designers are coming to realise that bending the rules for good RF grounding will eat into the margins of performance, spurious signal rejection and stability.

RF grounding of the KAT3 board is also far too dependent on the tightness of the screws at each end of the pillar and the cleanness of all the contact surfaces.

That ground return path can be much improved by connecting the mounting screw of J1 directly to the corner of the KAT3 board, using two solder tags that are overlapped and soldered directly together. My K3 doesn't

at upper ~~[illegible]~~ rt hand corner
there's a 2D connector
a long screw & a standoff is
fastened to the screw
See pg 22 of assembly manual

1st loosen screw that goes into the
inside end of the standoff
then tighten standoff ~~with~~ with 3/16"

When standoff is tight against 2D
connector then tighten screw again

necessarily work any better, but it does satisfy the
instincts of an old
VHF hound :-)

--

73 from Ian GM3SEK
http://www.ifwtech.co.uk/g3sek

____
____
Elecraft mailing list
Home: http://mailman.qth.net/mailman/listinfo/elecraft
Help: http://mailman.qth.net/mmfaq.htm
Post: mailto:[hidden email]

This list hosted by: http://www.qsl.net
Please help support this email list:
http://www.qsl.net/donate.html
Mark n2qt
Reply | Threaded | More

tbo=p&tbm=bks&q=inauthor:"Jan+Axelson"

USB 1.0 January 1996   Low Speed (1.5 Mbit/s)

https://en.wikipedia.org/wiki/USB

Serial port
From Wikipedia, the free encyclopedia

https://en.wikipedia.org/wiki/Serial_port

P3 OWNER'S MANUAL ERRATA

Rev. D-2, March 18, 2014

MAKE THESE CHANGES TO YOUR REV D MANUAL

1. **Page 7, first paragraph under *"P3SVGA Option*:** delete the last sentence that reads, "The P3SVGA also includes an interface for a future USB option that will permit direct digital mode operation via the K3 and P3 with data display on the P3 and P3SVGA screens."

   Replace that sentence with the following:

   The P3SVGA also includes a USB interface that can connect to a flash memory drive for screen dumps, and connect to many USB keyboards to allow direct digital mode operation via the K3 and P3 with TX/RX data display on the P3SVGA external screen.

2. **Page 40 (Parts List):** Change the length of the Ribbon Cable, 40 cond., E850438 from 36" (91.5 cm) to 18" (46 cm).

☐ Be sure the Mounting Area shown in Figure 1 is free of oil or dirt that would interfere with the self-sticking clip adhering to it. If necessary, wipe it with a cloth or paper towel moistened with cleaner and then ensure it is completely dry before proceeding.

☐ Gather the ribbon cable into neat folds and place the clip on the cable to hold it in place as shown in Figure 2. The clip has ridges to grip the cable tightly. Use gentle folds. Avoid creasing the cable.

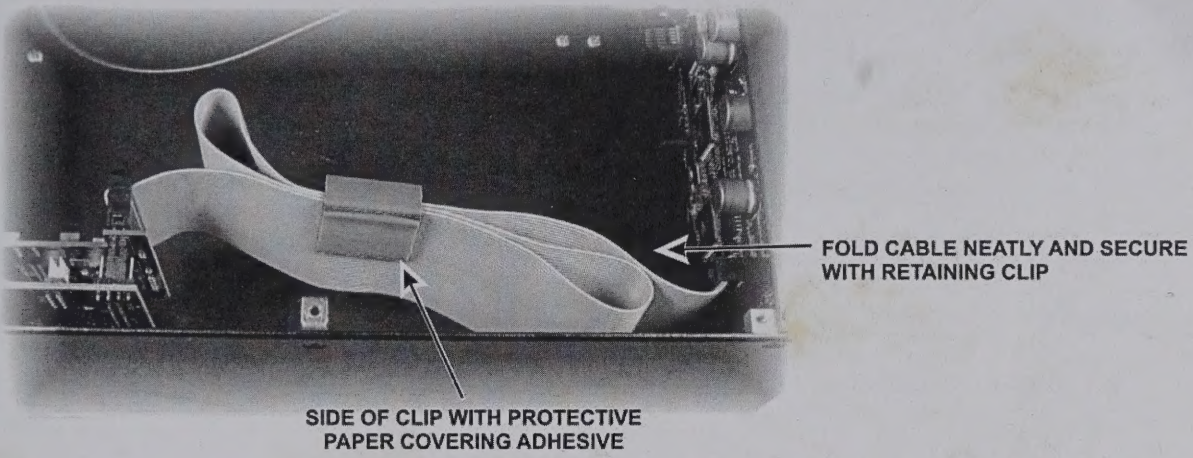

FOLD CABLE NEATLY AND SECURE WITH RETAINING CLIP
SIDE OF CLIP WITH PROTECTIVE PAPER COVERING ADHESIVE

Figure 2. Placing Clip on the Ribbon Cable.

☐ Slide the ribbon cable through the clip to adjust the folds so the clip lies near the side panel without being pulled away by the cable, then remove the paper backing from the adhesive side of the clip and press it against the side panel (Figure 3).

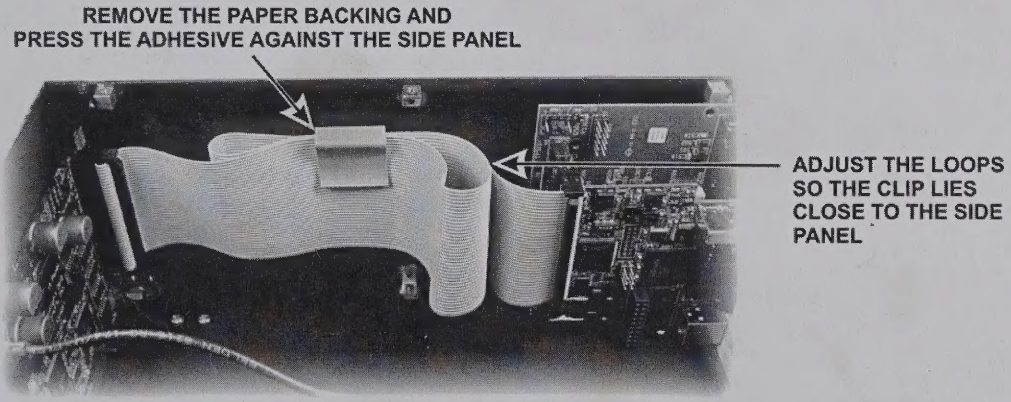

REMOVE THE PAPER BACKING AND PRESS THE ADHESIVE AGAINST THE SIDE PANEL
ADJUST THE LOOPS SO THE CLIP LIES CLOSE TO THE SIDE PANEL

Figure 3. Clip Mounted on Side Panel.

☐ Replace the top cover and all six screws (Figure 1).

This completes the installation of the cable retaining clip.

ELECRAFT P3 Application Note

Ribbon Cable Retaining Clip

Revision A, June 13, 2012
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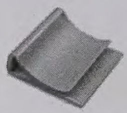
Background

A retaining clip has been added to hold the long ribbon cable near the side of the P3. This is to ensure the ribbon cable cannot find its way close enough to the front panel or RF boards to pick up stray signals that may show up on the display. Retaining clips are available from Elecraft. Order E980228.

Tools

#1 size Phillips screwdriver. To avoid damaging screws and nuts, a power screwdriver is ***not*** recommended.

Components Supplied

ILLUSTRATION	DESCRIPTION	QTY.	ELECRAFT PART NO.
	Retaining Clip	1	E980228

Installing the Clip

⚠You can install the clip without taking special ESD precautions to protect the circuit boards, but resist the temptation to touch the boards or other components inside your P3 while working.

☐ Disconnect power and all cables from your P3.

☐ Remove the six screws from the locations indicated by a ▷ on Figure 1 to free the top cover. Lift the cover off. There is a slot at one end that you can use to lift the cover once it is free.

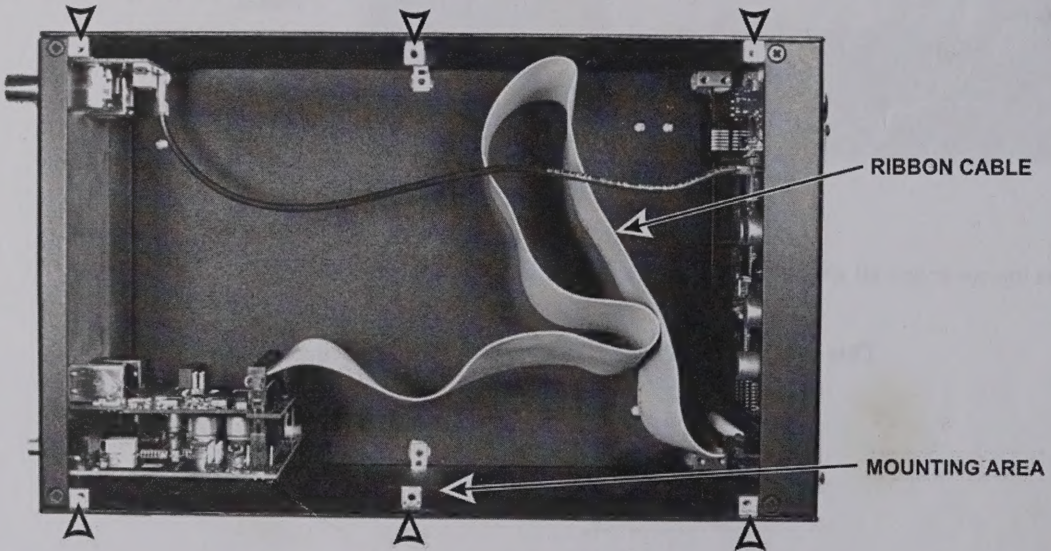


Figure 1. P3 Top Cover Removed.